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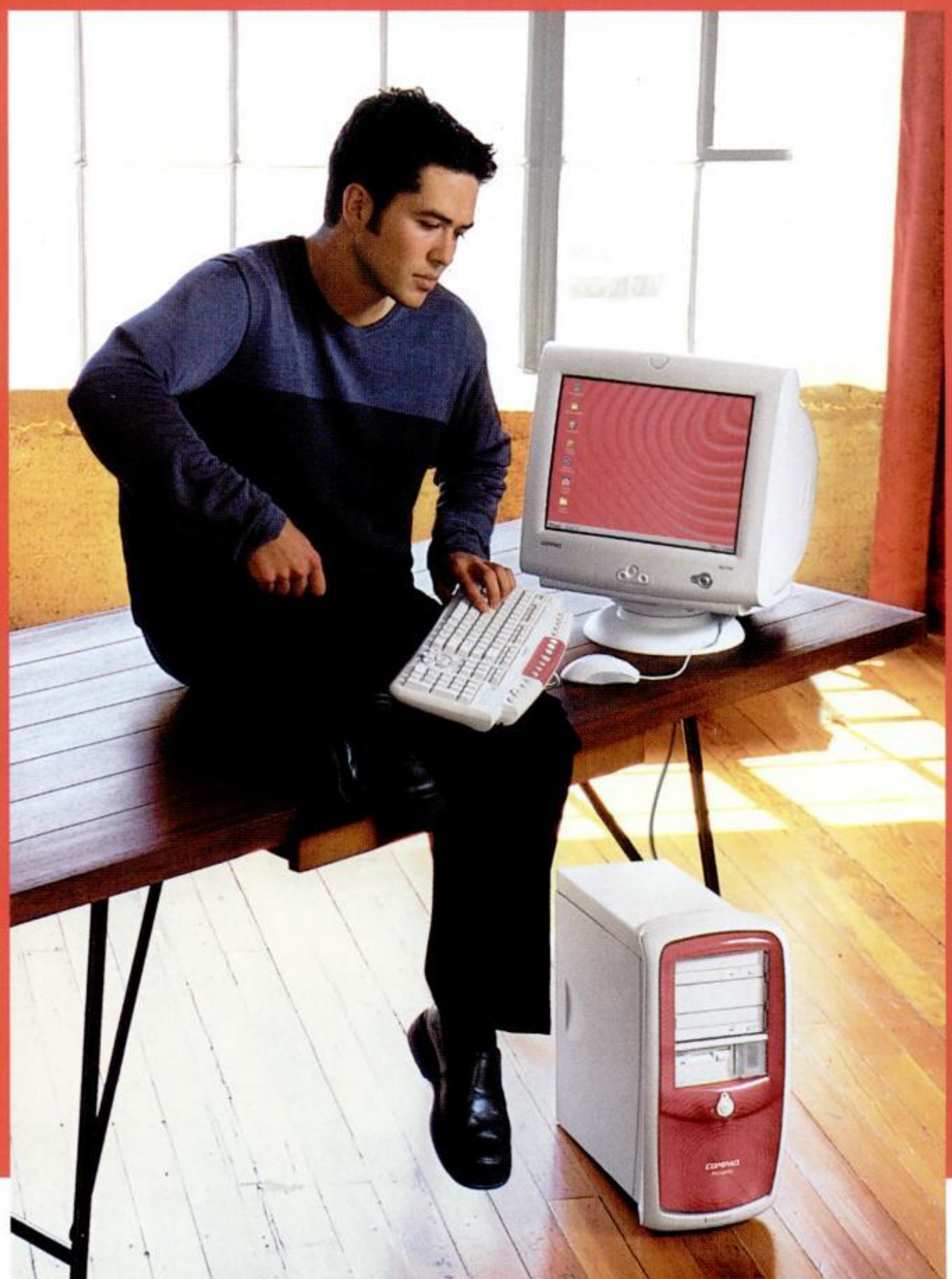

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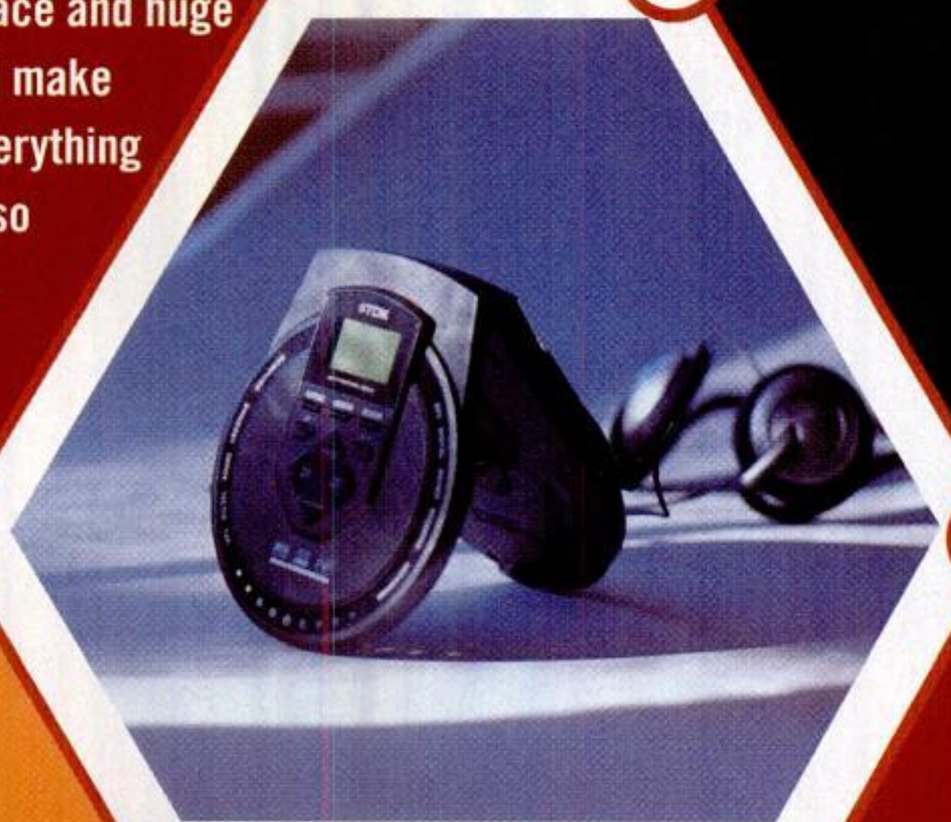

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Release Notes

Ain't no such thing as a free web lunch

More than 300,000 customers pay as much as $8 an issue for the opportunity to read this magazine every month. That's $8 more than what most people have ever paid for any month's worth of web content. Indeed, save for the porno sites, nearly all web sites give away their content for free. So how does this generous formula work? How do these sites stay alive?

Well, in fact, the formula *doesn't* work, and, as a result, content-driven web sites are dropping like gnats in a bug-spray Armageddon. The problem is that Internet ad banners are finally being revealed as utter shams, and advertisers just aren't buying them anymore. This should come as no surprise if you consider how *effective* advertising really works.

For example, when you watch TV and an ad comes on, your entire scope of perception is consumed by the commercial. Sure, you might space out and quit paying attention, but, if only for a split-second, your eyes and ears are completely focused on the ad. Same goes for print advertising. When you're flipping through the pages of *Maximum PC*, you're essentially forced to view ads as you search for more editorial pages. And if an ad catches your eye or promotes a product you're interested in, you likely stop and give the pitch your full attention.

Not so with online advertising. The essential design of a web page in no way forces us to examine ad banners if we don't want to. Think about it: Even a first-time web surfer can immediately train himself to zero-in on content because online ads are just so damn easy to avoid. Have you ever clicked on an ad banner? I haven't.

The future of the web doesn't bode well for "old-timers" like us who've been online since the early 1990s. We're used to getting our content for free and righteously complaining whenever "invasive" advertising like pop-up ads intrudes on our online experience. But in order to make ends meet, more and more web sites will be charging subscription fees and moving to increasingly in-your-face ad gimmicks that vendors are actually interested in supporting. Think pop-up ads are annoying? It will only get worse.

Thankfully, at Maximumpc.com we've decided to resist the new regime. When our web site is finally redesigned, you'll find a new site with less emphasis on advertising (though I suspect those *narsty* pop-ups will continue to pimp magazine subscriptions). We won't post daily updates, but the weekly updates you will find will be 100 percent free of charge and editorially driven.

—JON PHILLIPS

NOTE: Due to a scheduling error, we were unable to run two features promised in last month's Coming Next Month section. We will run the articles on internal case detailing and wireless devices in future issues.

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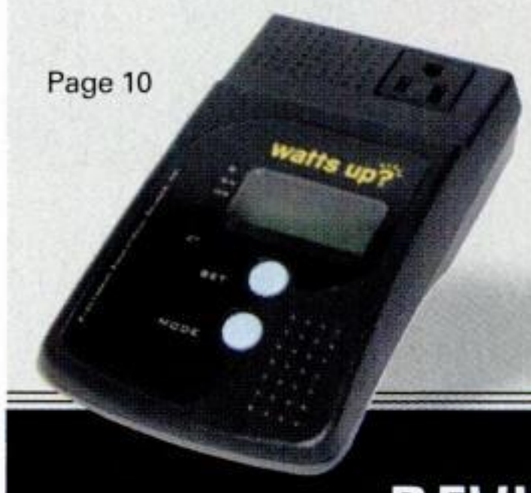

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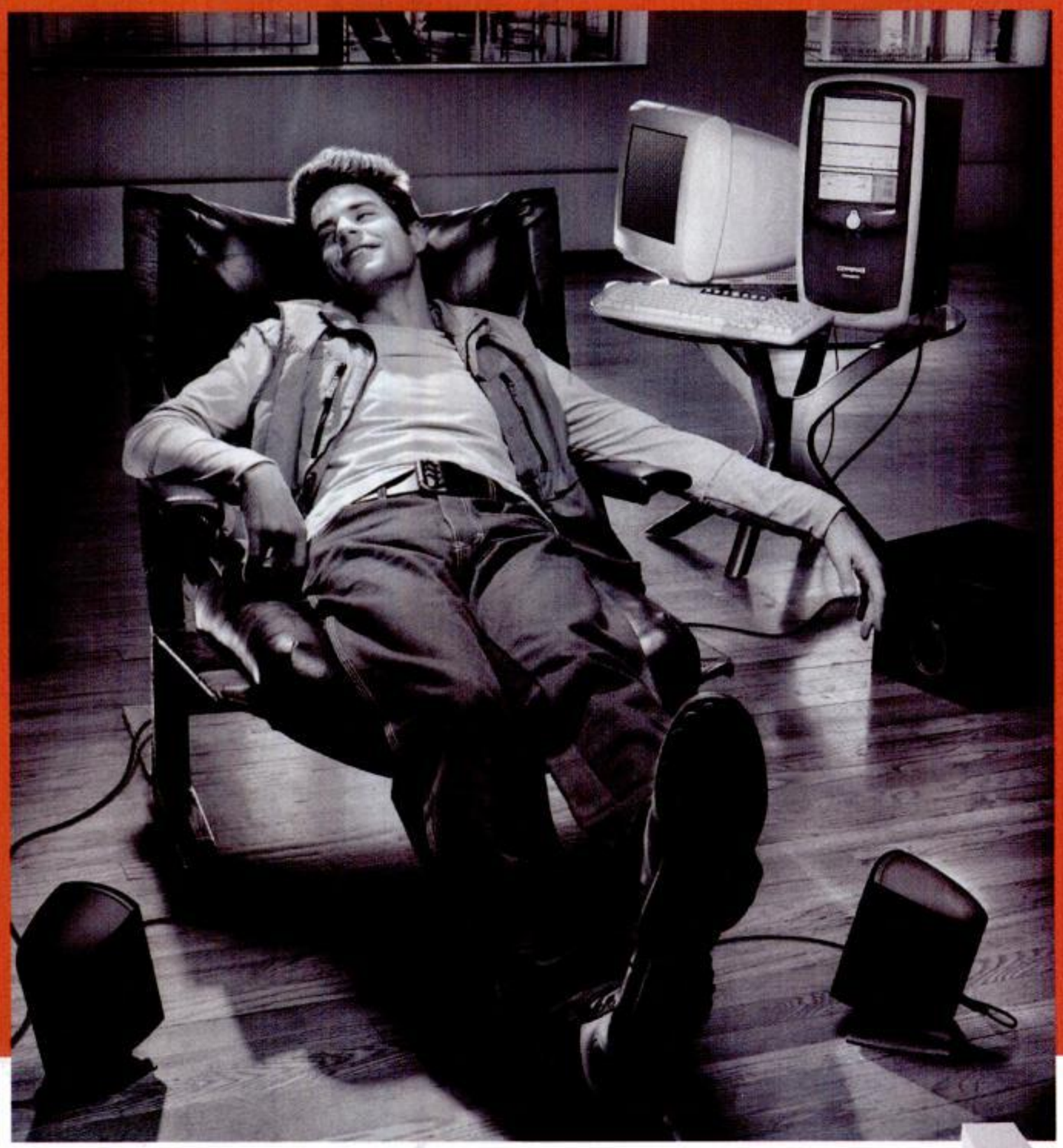

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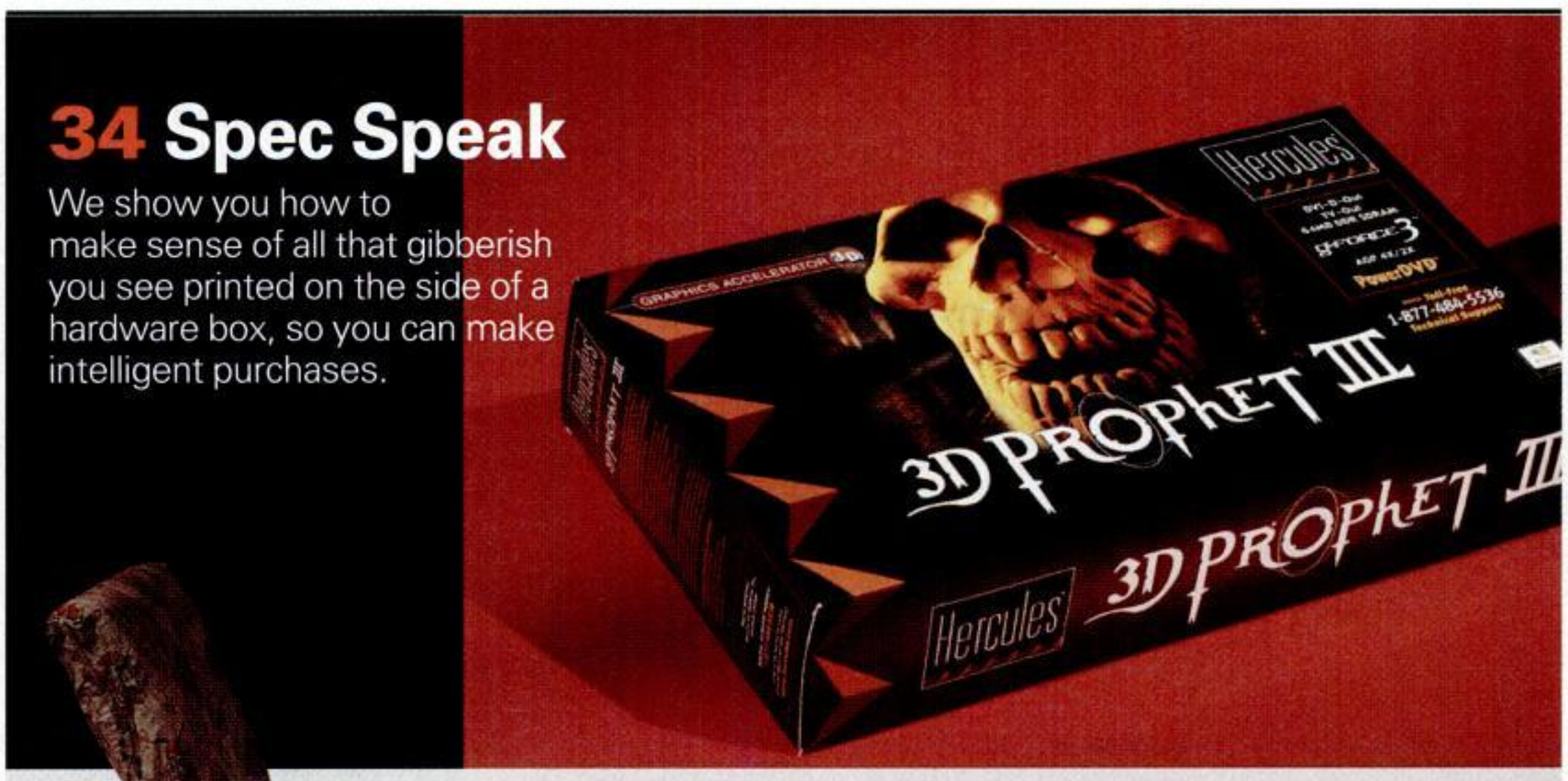


42 The Mod Squad

It's a special kind of individual who devotes his time and attention to PC customization that can only be described as "totally out of control." Meet four men who have done just that.

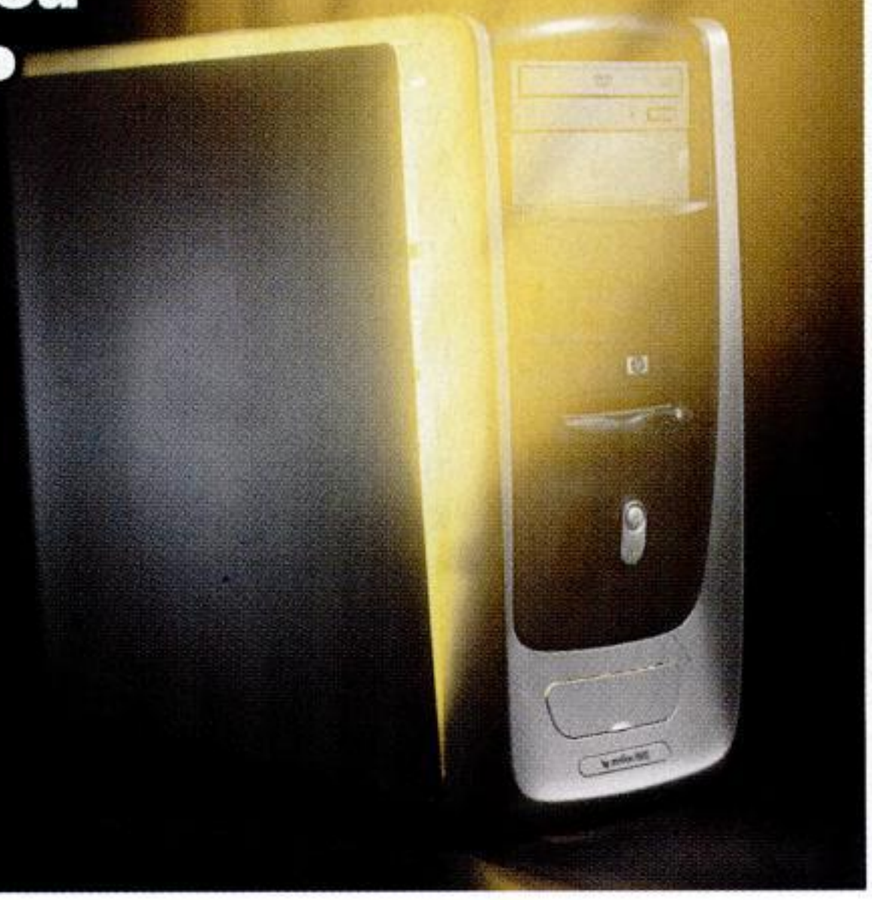
COVER FEATURE

Ultimate Upgrade Bible

Get the facts before you act on your impulse to upgrade your PC.

So you think it's time to take your PC to a higher level—to toss out those old parts and replace them with components that are newer, faster, *better*? Before you make any rash decisions or take any drastic steps, read this feature.

Our advice and recommendations could save you time and spare you from disaster.



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In/Out

You write, we respond

The Techie You Love to Hate

Dick Matthew's columns are the most hilariously insulting things I've read in quite a while, and I've learned several new, useful things from him already. It was the first thing I turned to in the latest issue, and I look forward to reading next month's column.

—PAUL FERRELL

EDITOR-IN-CHIEF JON PHILLIPS REPLIES: Indeed. Like a fine limburger that initially stinks to high hell but later becomes strangely appealing, we trust that this computer-age performance artist—this digital Don Rickles, this toxic amalgam of history's most abusive power users—will grow on even his most vocal critics. In real life, Dick is just a kind-hearted teddy bear. Shoot, even his noogies are set to stun.

A SEX SYMBOL, TOO? WHO KNEW!

I work full-time as a paramedic, I'm a mom to three "active" kids, I'm a game-aholic—and I think Dick Mathews is "the man." Sure, I can take apart a machine and fix it, even build the latest and greatest gaming machine, but when it comes to the basics like little tricks and tips for Windows, I'm a retard. Keep these columns coming because I, for one, don't have the time to figure out the little things in life. Oh, and I really don't care what the MCSE after his name stands for, so I chose my own: My Computer Stud Extraordinaire.

—Susan Cadis

XP EXCELLENCE

I'm currently testing Windows XP, and I love it! How many computers and/or lab rats do you have devoted to testing XP? What are your thoughts about the new design, the wizards, and the general performance of this new OS?

—Brad Chapman

TECHNICAL EDITOR AND OS GURU WILL SMITH RESPONDS: So far, we've been pretty impressed with XP's new features and interface, and we've always liked the Windows NT kernel's inherent stability. I've been running XP on my laptop since late last year, and I've found that even the earliest betas were more stable and robust than the final betas of Windows 2000. In fact, our only gripes with XP stem from features that may compromise user privacy, such as the product activation key that can be linked to your specific hardware and stored in Microsoft's records. Unfortunately, we can't really tell how features like the product activation key will be implemented until we see final code. Right now, the current thought around the *Maximum PC* homestead is that the gains in usability and stability will be enough to convince us to move from Windows 2000 and 98SE. But that could change if we discover unpleasant surprises in the final release.

BEWARE THE EMI

I've been pretty impressed with the cool case mods you've been writing about, especially the *Quake*- and AMD-logo cases you showed in the July 01 issue (those two are absolutely awesome!). I work at Northrop-Grumman in Eng/Mfg PC/network support. Northrop-Grumman is a defense contractor that builds F-16 radars and ultra-sensitive InfraRed sensors, and I showed those case mods to an RF engineer, who pointed out something I hadn't thought of. Because today's CPUs are running at such low voltages and such high clock-speeds, the processors and their motherboards are growing more and more sensitive to EMI (electro-magnetic interference) than ever before. Computer cases are made of metal for a reason—shielding. Not only do they keep EMI emitted by the CPU and motherboard from interfering with our TVs, VCRs, DVDs, etc., but they also help keep outside EMI from screwing up those ultra-high-speed operations going on inside our state-of-the-art PCs. Sorry to be a wet blanket, but be forewarned...

—Jeff Stennett

SENIOR EDITOR GORDON MAH UNG REPLIES: RF/EMI is indeed a recognized problem. In fact, OEMs such as Dell, HP, and Compaq must follow strict FCC guidelines and thoroughly test the amount of interference their machines emit. A PC's shielding keeps it from interfering with radio and TV signals, and, theoretically, keeps external signals from causing a blue screen on your PC. That's one of the main reasons that vendors discourage the permanent removal of side panels. But, to be honest, we've never actually been able to isolate EMI–related crashes from crashes that occur because of bad drivers, bad hardware, bad configurations, and so on. Sorry to sound like a broken record, readers, but be forewarned...

PORNO NO-NO

I was distressed by the references to pornography in several articles in your July 01 issue. I counted at least four references to Internet pornography—two within the same two-column article (Dick Matthews' "Windows Tips..."). I think such references are in poor taste and do nothing to enhance the quality of your magazine. I enjoy reading *Maximum PC*, but I would like to ask the editorial staff to consider removing porn references in future issues. I, for one, find that there is

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enough sex put before me by our culture without having to read about it in one of my favorite magazines.

—Steven Cherry

JON PHILLIPS REPLIES: We don't intend to advocate the, uh, "use" of pornography, Steven, but by the same token, we do have a responsibility to accurately reflect the real-world user experience in the pages of the magazine. If only a scant percentage of PC users viewed porn on their computers, we'd have no need to ever mention the word. But the fact is that porn is a big part of the PC experience, and, as a magazine that comments on topics of the day, we can't ignore porn entirely. To do so would be akin to covering 3D games but never referring to the violent ones. Please note that we do not run nudity in the magazine, nor do we accept advertising for porn sites or software.

WHO'S YOUR DADDY, LOGAN?

Does Logan Decker work for you or for Compaq? A Kick Ass Award for the Presario 7000 (June 01)? Get serious, Logan! I can't believe this box got higher than a 5 verdict. To wit:

- Cooling: You can't tell me that the wimp-butt heatsink and fan on the CPU will keep the proc chilly. What about case fans? I sure don't see any! You mean, Logan, that the fan in the underpowered power supply will take care of air movement?
- Graphics: What's with using videocards that won't support DirectX 8? Guess they gotta use up the remaining stock, huh?
- Sound: Nice move, pairing the best speakers on the market with a cheapo Sound Blaster card that's one step up from using onboard sound.

"Stylish presentation" and an "exhilarating out-of-the-box experience" do not a Kick Ass box make. Being a former Compaq owner (Presario 7360) left the taste of dirty socks in my mouth. If you keep this rig for a few months, I've got a feeling you'll discover why I refer to the company as "Compuke."

—Hal Walter

ASSOCIATE EDITOR LOGAN DECKER REPLIES: After arriving at work this morning in the new Lexus that Compaq generously provided—which, of course, in no way influenced my review—I set out immediately to address your concerns. You're correct: A stylish presentation doesn't justify a Kick Ass Award. But a fairly priced, well-designed PC that simultaneously breaks benchmark records and offers cutting-edge technology *does* justify a Kick Ass Award.

The heatsink/fan combo on the processor is actually larger than the one on AMD's reference board. The Creative Labs 3D Blaster Annihilator II Ultra DDR videocard supports DirectX 8, but only cards that support programmable shaders—namely, GeForce3 cards—will run the new *3DMark2001*. The Sound Blaster Live! Value, which supports 4.1 surround for the bundled Klipsch speakers, only differs from the Platinum 5.1 model in that it lacks the Live! Drive and Dolby Digital output.

It's not that I don't feel your pain—I've long been critical of Compaq's systems because of their proprietary components and adulterated software. The Presario 7000 machine, however, is a strong departure from that awful legacy and a good sign of things to come.

VINYL SOLUTION

I enjoyed the article about making MP3s from old vinyl records (How To..., June 01). Here's a hint for dealing with records that have a lot of wear: Cover the surface with a thin layer of liquid while you're playing them. I use a small paintbrush to apply a mixture of Windex and rubbing alcohol (the alcohol is optional, but it reduces the speed of evaporation and allows the solution to last longer). This doesn't remove all noise, and it does stink, but I find that using this solution generally reduces about half of the static noise that normally shows up on recordings made from vinyl.

—J. Frank LaDue

FEATURES EDITOR KRISTEN SALVATORE REPLIES: Thanks for the tip. We had a lot of positive response to the article, but there were, however, a few questions that came up repeatedly. Here are some answers:

- ***Clean 2.0* is made by Steinberg. You can find more about it at www.steinberg.de.**
- **The turntable we used was an Aiwa PX-E860.**
- **Radio Shack has done a nice job of making us look like boobs by deciding not to carry pre-amps in their stores any longer. Thanks, guys! You can, however, purchase it online at www.radioshack.com (search for catalog number 970-1018).**

It's Hate Mail of the Month time! And who will be the lucky recipient of $7.99—the price of the magazine on the newsstand—collected directly from the pockets of *Maximum PC*'s editors? This month, it's Gary Onks who's now eight bucks richer. And we are richer for having heard from him:

Dear *Maximum PC* (Petty Crooks),
Your magazine is a fetter,
to this great life of mine,
and the only thing better,
at wasting my time,
is writing this letter,
for a lousy $7.99!!!
Return my hard-earned cash,
from your ill-gotten stash!

We'd also like to add: Any references to using the magazine as toilet paper or liner for your cat's litter box will immediately disqualify your letter from the contest. We've read those two jabs so many times already, they don't elicit so much as an eye-roll anymore. *Originality*, people! If you think you can do better than ol' Gary here, visit www.maximumpc.com for the Hate Mail contest rules.

CUT, COPY, PASTE

- In our June 01 Gaming Awards feature, we apparently misrepresented problems with the initial release of *Fallout Tactics*. According to Heather Greer, who works at Interplay, "When *Fallout Tactics* was being duplicated for final release, a small number of copies had a duplication error. This was not a QA oversight [as *Maximum PC* stated], and the error only affected a small number of buyers of the product."

- A second goof in the Gaming Awards feature claimed that *Diablo II* requires 3D acceleration. This isn't true. The game supports 3D acceleration—quite pathetically, in fact—but it does not require it.

- And here's a good one: In the DiamondMako review (June 01), we printed the company's phone number as 800.468.5486. This just happens to be an adult entertainment line ("Hot girls love phone sex too... real working girls, housewives, and students!"). The actual number for DiamondMako is 800.468.5846. Sorry, Steven, but we just had to mention porn one more time.

LETTERS POLICY: MAXIMUM PC invites your thoughts and comments. Send them to input@maximumpc.com. Please include your full name, town, and telephone number. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.

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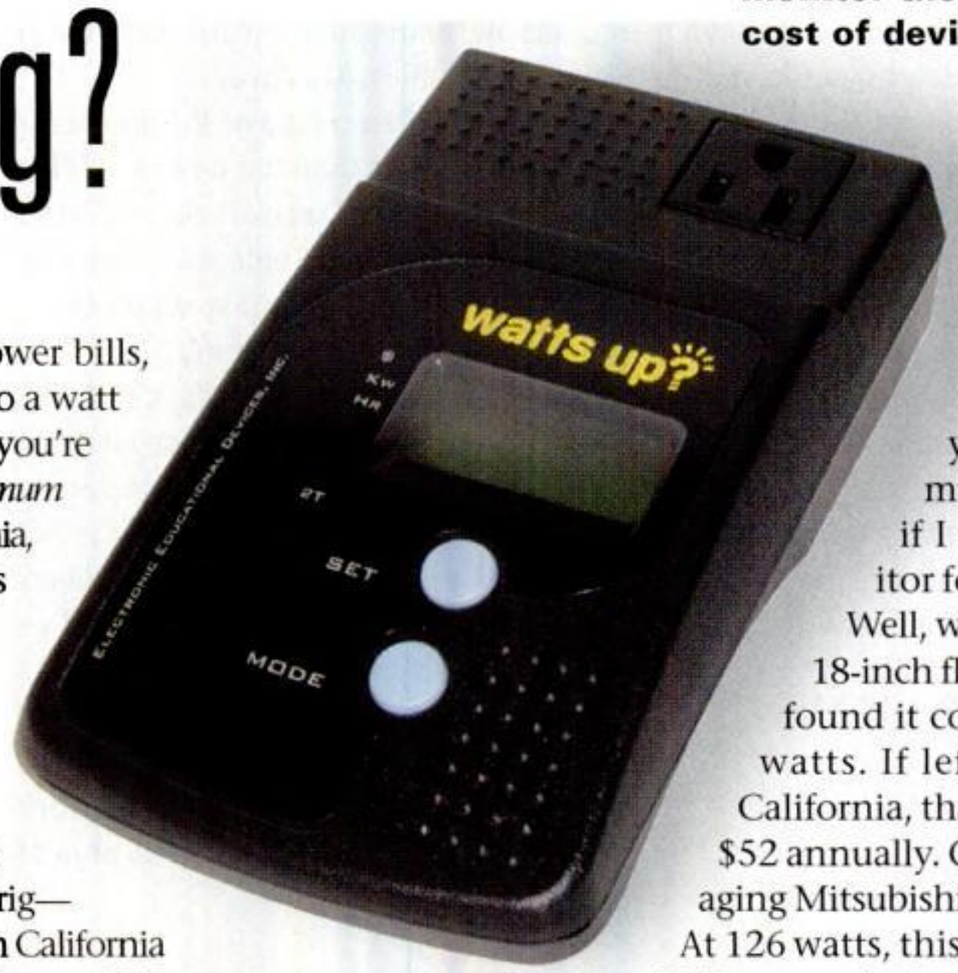
Quick Start

The beginning of the magazine, where articles are small

THIS MONTH: ENERGY CONSERVATION

Is Your PC a Power Hog?

Electronic Educational Devices' watt meter lets you monitor the power use and cost of devices in realtime.



If you're worried about increasing power bills, you might want to hook up your PC to a watt meter to determine just how much juice you're actually burning. That's what we did at *Maximum PC* HQ—which is located in Northern California, home to some of the wackiest power bills this side of Hell.

We used a watt meter from Electronic Educational Devices (**www.doubleed.com**), which measures the load of any appliance or computer that's plugged into it. Our own Hewlett-Packard Pavilion test-bed system—a bare-bones 1.3GHz P4 rig—consumed roughly 82 watts after boot up. In California as of June 2001, that translates to about $87 a year, if left on 24/7.

This may not sound that bad, but these numbers reflect only what the PC consumes at idle. When the PC is actually a-buzzin' and a-whirrin', energy consumption increases. The energy spent to play a music CD, for example, increased power consumption to 86 watts. Consumption increased even further during a round of *Counter-Strike*. The online game taxed the videocard, soundcard, and NIC to the tune of 112 watts.

If you think doing your duty in the name of science is always a good thing, think again. The *SETI@Home* screen saver—which uses a PC's "spare" CPU cycles to crunch data in search of extraterrestrial life—is, in fact, a severe power hog. As the screen saver petitioned our CPU, memory, and hard drive for system resources, it ate up 120 watts.

Of course, more feature-laden, powerful PCs consume more power. By adding an 8x Plextor CD-R burner and a second hard drive to our HP, we increased power consumption at idle from 82 watts to 100 watts. We also tested a monster dual-Athlon machine with three hard drives and 512MB of memory. Surprisingly, the beast consumed only about 200 watts at idle. Power-supply vendors have long argued that a more powerful power supply actually uses less power, and it seems that they're right.

We know what you're thinking: How much money can I save if I ditch my CRT monitor for an LCD flat panel? Well, we tested a KDS Radius 18-inch flat-panel monitor and found it consumed a steady 43 watts. If left on constantly in California, that works out to about $52 annually. Contrast that with an aging Mitsubishi DiamondPro 1010E. At 126 watts, this monitor costs about $148 a year. And unlike the LCD panel, the CRT will actually consume more power depending on your specific computing activity. For example, when running Microsoft *Word* or *Excel*—which ask all three of a monitor's electron guns to fire in unison to produce a white background—power consumption spiked to 150 watts, but a dark-blue background consumed an average of 126 watts. Background color, of course, made no difference during LCD flat-panel testing; LCDs boast backlights that are either always on or always off.

So how do you conserve power? You can start by powering down peripherals that aren't in use. This means turning off printers, scanners, and speakers. If you really want to save power, enable the Windows option to automatically turn off your hard drive and monitor after brief periods of inactivity. And, if possible, take advantage of hibernation modes instead of sleep modes. Unlike the suspend/sleep mode that keeps the system warm and ready to go, the hibernation mode copies the contents of RAM to your hard drive and cuts power consumption to near zero.

New PCs will soon carry Intel's Instantly Available PC technology. IAPC cuts all power to devices, yet allows for almost instant reactivation. It's a technology that's long overdue for the PC platform.

This 1.5GHz P 4 consumes about 100 watts of power at rest, but a CPU- or disk-intensive application pushes it to 145 watts.

TIPS FOR REDUCING PC POWER CONSUMPTION

- Turn off or unplug your speakers when they're not in use.
- Turn off CPU- and memory-intensive screen savers.
- Change screen background to a dark color.
- Take advantage of hibernation mode.
- Consider upgrading to an LCD flat-panel monitor.
- Reduce the time Windows waits before spinning down hard drives and turning off your monitor.
- Set system fans to turn off when not in use.
- Keep intensive 3D gaming to off-peak hours.
- Consolidate power bricks on a single power strip that can be turned off.

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Integrated Graphics That Don't Suck

New mobo chipset from nVidia promises GeForce2 graphics for Athlon rigs

The nForce offers dual DDR memory support and GeForce2 graphics.

IF YOU'VE ALWAYS THOUGHT of integrated graphics as something more toxic than the plague, you've been right. Integrated graphics are embedded in a PC's core-logic chipset and can single-handedly drive a computer's video subsystem—no additional videocard is required. This might sound good on paper, but integrated graphics are usually woefully underpowered and sometimes can't even be disabled when you want to assign video duties to an add-in card.

But times have changed. In June, nVidia introduced a new motherboard chipset for AMD Athlons and Durons that might rewrite the history of integrated video support. Dubbed nForce, the new chipset promises GeForce2-level graphics as well as the ability to decode/encode Dolby Digital 5.1 audio in realtime.

Traditional mobo chipsets feature a northbridge chip that controls the interactions among main system memory, the AGP bus, and CPU. This northbridge is linked to a PC's southbridge chip, which controls the PCI cards, USB controller, and IDE hard drives.

Nvidia says the nForce breaks this convention, and describes the new chipset as a "distributed platform" because it boasts ultrafast connections and an unprecedented number of features directly within the chipset. The new integrated graphics processor (IGP)—which replaces the northbridge, integrates a GeForce2 core—a 128-bit memory interface to main memory, and a dynamic adaptive speculative pre-processor (DASP) that acts like a third level of CPU cache and attempts to predict what data will be used next. The company claims a 20-percent performance boost from this feature alone.

Unlike discrete graphics cards, which rely on onboard memory, the nForce will rely on main system memory for chores such as storing textures. With previous integrated graphics chipsets, swapping data with main system memory has always led to bottlenecks. But nVidia says it's conquered this limitation with its TwinBank memory architecture. TwinBank offers a 128-bit memory interface to DDR memory. By interleaving memory access, nVidia says it can achieve up to 4.2GB/sec of memory bandwidth—which is even greater than the 3.2GB/sec boasted by the Pentium 4 and its dual-channel RDRAM.

For lower-level functions, the IGP is tied to the media and communications processor (MCP). The MCP, like a typical southbridge, controls hard drives, PCI devices, and USB. But it also adds home phone-line networking support, fast Ethernet support, and the option to encode/decode Dolby Digital 5.1 audio. Hook an nForce PC to the Dolby Digital receiver in your living room, and you'll be able to play a DirectSound3D game in full surround-sound. Mobos with nForce will also feature AGP slots that disable the nForce's on-chip video when a card is dropped in. Expect to see two nForce versions: the 420D for the high end, and the 220, which gives you only 64-bit memory support and strips out Dolby Digital support.

So why is the 3D graphics giant getting into the mobo business? Dean McCarron, principal analyst with Mercury Research, says it's all about the money. Of the 160 million PC chipsets sold every year, almost 50 percent feature integrated graphics. Intel owns the lion's share of that market with its 810 and 815 chipsets. The challenge nVidia faces is pricing. It's not known if companies are willing to pay a premium for the superior GeForce2-level graphics. Intel has already stated that people just don't care about performance in integrated components.

Nvidia counters that people *are* willing to pay for more performance—it's just that no performance-oriented integrated chipsets have ever been available. Expect to see nForce-enabled mobos later this year.

▶▶ FAST FORWARD

BY TOM R. HALFHILL

RAM's Fatal Flaw

If you're the proud owner of a new computer with PC2100 DDR SDRAM, it's tempting to think you've got memory that does justice to your gigahertz-plus CPU. Guess again, dude. CPUs have been racing memory since the dawn of computing, and memory is losing badly.

How badly? In 20 years, CPU speed has increased more than 300x. Meanwhile, DRAM speed has increased about 4x. That's hardly even a race.

Actually, it's a hare-and-tortoise race in which the hare keeps accelerating but is chained to the tortoise. CPU speed doubles every three years, while DRAM speed doubles every 10 years. This is a problem because fast CPUs need fast memory. The CPU's job is to run software, and to do that it must fetch program instructions and data from memory. If the memory can't keep up, the CPU stalls, and all those megas and gigas of clock cycles we celebrate are wasted.

This is often called the "CPU-memory bandwidth gap," but bandwidth isn't the real problem. In fact, DDR SDRAM succeeds at expanding bandwidth to match the latest CPU speeds. In the same 20-year period that CPUs accelerated more than 300x, memory bandwidth increased more than 400x, thanks largely to DDR SDRAM.

Do the bandwidth math: Today's CPUs have a 64-bit-wide memory interface, which means they can transfer eight bytes in one clock cycle. The "DDR" in DDR SDRAM means "double data rate," indicating it can transfer twice as much data per cycle. These are bus cycles, not core cycles, so a CPU with a 133MHz bus can transfer more than 2GB (8 x 2 x 133 million) per second. That's almost 2100MB, which is where "PC2100" DDR SDRAM gets its name.

AMD claims that Athlon processors have a 200MHz or 266MHz bus, and Intel claims that the Pentium 4 has a 400MHz bus. Both claims are well-intended but misleading. Actually, the Athlon's bus runs at 100MHz or 133MHz with two data phases per cycle, so the effective speeds are 200MHz and 266MHz. The Pentium 4 bus is even more clever, running at 100MHz with four data phases per cycle, for an effective speed of 400MHz.

Unfortunately, bandwidth isn't the same as latency. Bandwidth determines how much data the CPU can transfer in one gulp; latency is how long that takes. And that's where DRAM is losing big-time. Twenty years ago, DRAM latency was about 120 nanoseconds (ns). Now it's about 30ns, a mere 4x improvement. Meanwhile, CPUs zoomed from 4.77MHz to 1.5GHz, a 314x improvement. Faster DRAM is always under development, but the gap keeps widening. The stopgap solution is larger caches, both on- and off-chip. One bright spot on the horizon is that rising demand for faster network switching and routing may prod DRAM vendors to try even harder.

Tom Halfhill was formerly a senior editor for Byte *magazine and an analyst for* Microprocessor Report. *He is now a technical writer/analyst in Silicon Valley.*

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OUR SPIN

Overrated/Underrated

Nobody would disagree that flippers are a neat idea. But fingers are an even better idea. And don't even get us started on opposable thumbs.

So it goes with technological evolution as well: We're continually challenged to let go of comfy, familiar hardware in favor of technology that might improve our lives. Here's our two cents on over- and underrated technologies currently fighting it out on the tech food chain.

ALL HYPE vs. NOT ENOUGH AIRPLAY

ATA-100: Sure, it increased burst speed over ATA-66, but it offers no noticeable everyday benefits.	**RAID 0**: With fire-sale prices on huge hard drives, RAID 0's zippy transfer rates look better every day.
FORCE-FEEDBACK JOYSTICKS: Clutching a twitching joystick evokes the sensation of restraining a strong rodent.	**FORCE-FEEDBACK MICE:** These next-gen mice provide useful feedback for more intuitive navigation.
COMBO OPTICAL DRIVES: When squeezing DVD- and CD-burning support into one drive, amenities such as fast transfer rates and Burn Proof inevitably get left behind.	**DVD-R:** Pioneer's introduction of the sub-$1,000 A03 drive is a huge leap forward in optical storage.
USB: Device conflicts, bandwidth hogging, and power struggles still plague what was once considered a panacea.	**FIREWIRE:** Brains, brawn, and bandwidth to spare. Now if only more PCs came with FireWire support...
SCSI: Consumers who were once forced to pay a premium for SCSI's robustness...	**IDE:** ...Can now get similar, and sometimes better, performance from this budget bus.
FRONT PANELS IN WACKY COLORS: Swapping plastic faceplates isn't our idea of an upgrade.	**FRONT-MOUNTED USB/FIREWIRE PORTS:** Intelligently placed ports portend the end of the cable crawl.
ZIP DRIVE: We were initially grateful for this capacious answer to the floppy, but it hasn't aged well.	**MICRODRIVE:** Now boasting capacities of 1GB, this tiny drive can solve a lot of storage problems.
MASSIVE CD-BURNER CACHE: An expensive alternative to a better technology called Burn Proof.	**BURN PROOF:** It works. Now we can all go back to using *real* coasters.

DOUBLE-TALK

Your Guide to Tricky Tech Speak

In a corporate world where losing your job is called a "re-calibration of resources," we've become accustomed to more and more silly phrases that attempt to sugar-coat life's ugly realities. Unfortunately, the PC technology world is battling euphemism creep as well...

"Bug" or "erratum"?

"Less than optimal consumer experience"
Microsoft's own WindowsXP reviewer's guide actually admits that previous MS OSes sometimes offered a"less than optimal consumer experience." We have a few euphemisms for "less than optimal" too, but we can't print them.

"Sharing"
Napster called the power to distribute near-CD-quality copies of songs to millions of people in the blink of an eye "sharing." We prefer our own term, "music previewing."

"Erratum"
Commodore Grace Hopper literally caught a bug in one of the first computers—and then "debugged" the machine. Today, marketing drones would have you believe that she "contained an erratum."

"Service packs and point releases"
In the early days of computing, they used to call it a bug patch. Nowadays, Microsoft calls it a "service pack" and id Software calls it a "point release."

"Simplified pricing structure"
You used to pay $50 per 100 licenses of your office suite. Now that the company wants to pull in more money, it "simplified" its pricing structure, which means you pay $100 per 100 licenses. That *is* simple.

"Knowledge worker"
If your ass hurts after sitting in an office chair for 10 hours a day, you might be a "knowledge worker." This is not to be confused with a service worker, who asks if you'd like to "super-size it."

"Value PC"
Just as a Yugo isn't a cheap piece of crap, but rather an economy car, a Packard Bell isn't a cheap piece of crap, but rather a "value PC." But if it looks and smells like it, then...

"Known issue"
Asking a software company to admit there's a bug in its software is like getting a politician to say the words "tax increase." Some companies are quite aggressive in fixing "known issues," but others simply use the euphemism to say, "Yeah, it's a known issue. Now go away."

"Pre-beta"
If "beta" means "blue-screen god of vengeance," then "pre-beta" means "it'll trash your Registry and have you reinstalling your OS

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Pocket Zip™ $99.95*		•							40MB capacity 0.6MB/second	40MB					
HipZip™ $199.95					•				40MB capacity 0.4MB/second	40MB					
Zip® 100 $79.95***	•		•		•					Up to 100MB capacity Up to 1.4MB/second	100MB				
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HACK, SOLDER, PAINT

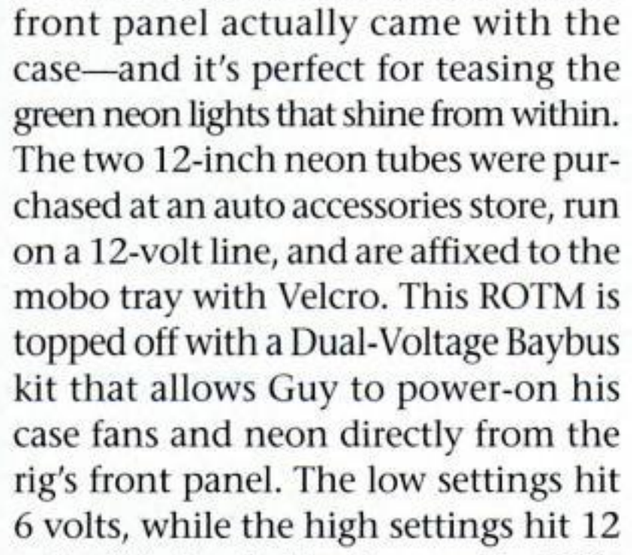
Rig of the Month

When we called ROTM winner Guy Coniglio to ask him questions about his kick-ass customization job, we encountered an easygoing, laid-back dude—which just goes to show that you don't have to be an anal-retentive control freak to build a pristine rig loaded with delicate details.

Guy's box is based on a Lian-Li PC68+usb case. The display window was cut out with a Dremel tool, then fitted with a piece of Lexan, which is a polycarbonate that's shatter-proof, clearer than Plexiglas, and about 30 times stronger than acrylic of equal thickness. Door-edge molding—the same kind you'd find in automobiles—seals the window, nice and tidy-like.

Inside sits an Asus CUSL2-C "Black Pearl" mobo. This is a special-edition board that boasts a black PCB and a gold heatsink on the chipset, and is bundled with a boot-logo utility that helps you customize your own 16-bit-color start-up screen. Guy complements this bad mama-jamma of a mainboard with some awesome cabling. The gray IDE cables came pre-rounded from Crazypc.com, while Guy himself encased his ATX power supply cabling in "snakeskin" casing, which expands and contracts just like the Chinese Finger Prisons we used to play with in the 1970s. A Thermaltake Golden Orb cools the Intel Pentium III 933eb that's been OC'd to 1064MHz. And that big blue monster in the AGP slot? That would be a GeForce3 card from Hercules.

The Lian-Li case has a stock exterior, but Guy painted his optical drives with Krylon Stainless Steel Metallic. The trick see-through grille at the bottom of the front panel actually came with the case—and it's perfect for teasing the green neon lights that shine from within. The two 12-inch neon tubes were purchased at an auto accessories store, run on a 12-volt line, and are affixed to the mobo tray with Velcro. This ROTM is topped off with a Dual-Voltage Baybus kit that allows Guy to power-on his case fans and neon directly from the rig's front panel. The low settings hit 6 volts, while the high settings hit 12 volts. We simply like the way the LEDs light up in the dark.



If you have a contender for Rig of the Month, e-mail input@maximumpc.com—we'd especially like to see insane cooling contraptions, so get cracking!

GAME THEORY BY THOMAS L. McDONALD

To E3 and Back Again

This year's E3 was definitely all about the console game, with PC titles not just taking a back seat, but getting duct-taped and stuffed in the trunk. For all that, I still came away pretty impressed with the state of the industry. Sure, there were fewer titles, but there were enough good ones to keep you from becoming a productive member of society. So quit yer bitchin' already.

- **Best of Show: Anything from the hands of BioWare, which amounted to *Neverwinter Nights* and *Star Wars Knights of the Old Republic*; Verant's *Planetside* and *Star Wars Galaxies*; Activision's *Medal of Honor* and *Master of Orion 3*; and *Sigma*.**
- **Worst of Show: The dumbass Star Wars RTS. Its name was quickly forgotten, but if it has Star Wars and strategy anywhere in the description, spend your money on something more useful, like vole-skin oven mitts.**
- **Like Westwood before it, Blizzard seems to have not just rested on its laurels, but fallen into some kind of cataleptic trance on them. *Warcraft III* was spanked by *Battle Realms*, got its ass kicked by *Age of Mythology*, and was sent to its room crying by the awesome *Sigma*. Blizzard seems to be coasting on the past glories of its two mega-franchises, *Diablo* and *Warcraft*. Once that happens, *Tiberian Sun* is never far behind.**
- **There was a miasma of desperation around the GOD Games Promised Lot, an offsite, all-day, tittie-and-freak show that, some say, also had demos of *Duke Nukem Forever*, *Max Payne*, and other games. Hey, a free beer—and a midget's head to rest it on—is always welcome, but having to huff and puff that much to draw attention to yourself might explain why your only title that has sold really well is *Railroad Tycoon II*.**
- **That smell permeating the *Shadowbane* booth—and indeed most of the massively multiplayer online RPG demos—was the scent of doom. Some of these titles look terrific, particularly *Shadowbane*, *Anarchy Online*, and *Dark Age of Camelot*. But it's been over 18 months since anyone rolled out a new MMRPG, and those were from major players. If Origin and Microsoft had problems, what do you think Mystic and Funcom will face?**
- **And as if to prove my point, *World War II Online*, which showed very well at E3, experienced the worst rollout yet of a multiplayer game on its launch date. After shipping 100,000 units, Strategy First and Playnet were shocked, *shocked*, that people bought them. With 20,000 new account registrations within a few hours, the servers—capped at 500 users each for roll-out—were brought to their knees. The fact that the game wasn't finished didn't help either. A 60MB day-one patch? That's not a game. That's a boxed beta.**

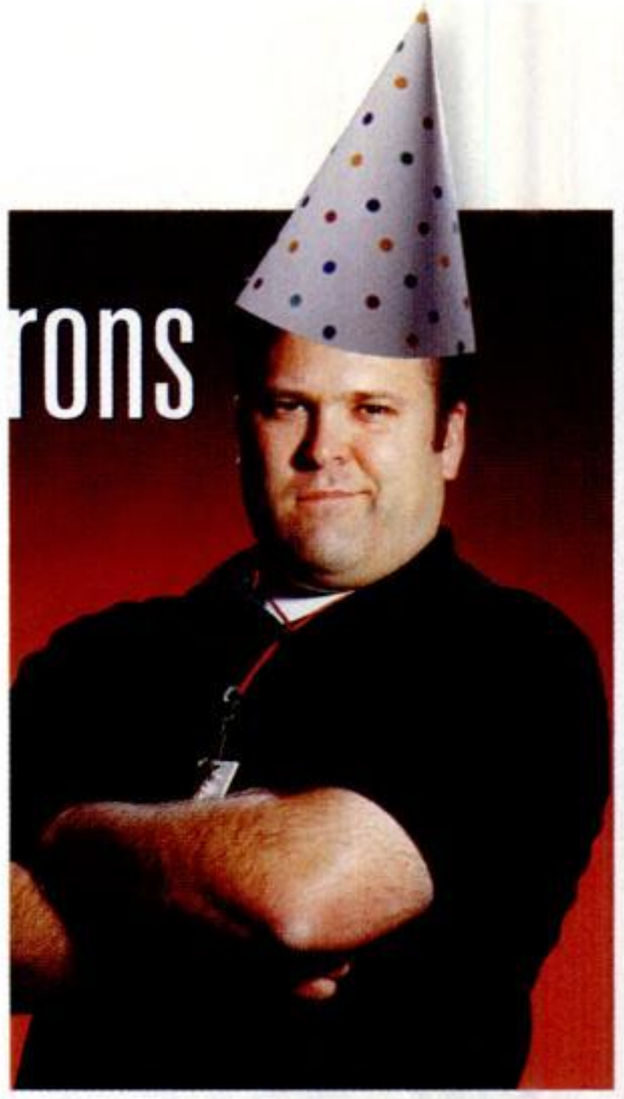
Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

Reprinted Material

HELPFUL HINTS

Windows Tips for Morons

Life's a Dick and then you die



OK, which one of you poo-butts busted Uncle Dickie? Human Resources just chewed out my ass for what is officially being called "making grown men cry." Well, here's a news-flash for the suits in HR: It's called "tough love," and what's good enough for the boys at the Fenton Hill Military Academy is good enough for the know-nothings who scurry around looking for cheese in the fifth-floor cubicle maze.

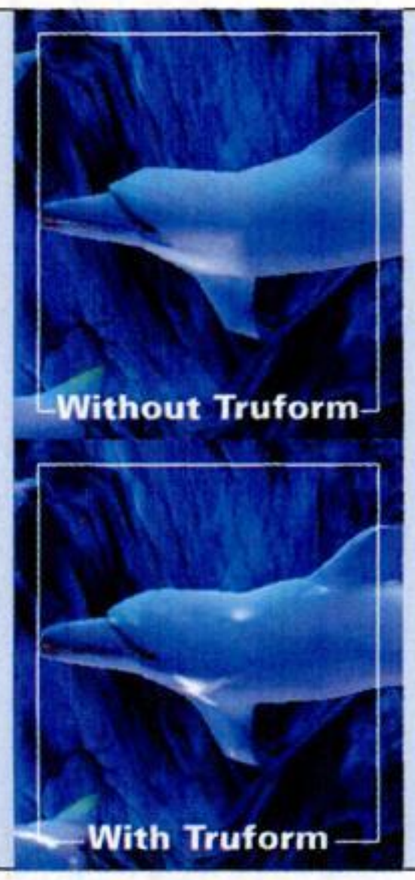
Whatever. The point being, I received an official reprimand, and now I have to wear this party hat for 30 days so that I may be "duly humiliated in public." Well, guess what? I *like* party hats—because every day's a party when I'm getting my grump on.

You? Well, you need to get your Windows on. And you can start by learning these nifty tricks:

- Simultaneously pressing the Windows key and the "R" key brings up the Run menu.
- Holding down the left Shift button while deleting a file bypasses the Recycle Bin and completely removes the file from your hard drive.
- Want to add more folders and removable storage devices to your right-click Send To menu? It's as simple as making a shortcut to that special folder or device and dropping that shortcut into Windows' Send To folder. In Win2000, the Send To folder is in the Documents and Settings directory, under your user name. In Win98, the Send To folder is in the Windows directory.
- And here's a tip that's only for Win2000 users (who tend to be more foolhardy than outright moronic): If you want to auto-complete the names of directories and files when you're in the Command Prompt window, simply hack your Registry. Go to HKEY_CURRENT_USER\Software\Microsoft\Command Processor and change CompletionChar from 0 to 9. Just remember that whenever you mess with your Registry, you run the risk of royally borking your entire system, so back up, save, and all of that other "I-live-in-mortal-fear-of-my-computer" crap.

And one final tip, kids: Don't play with matches. Uncle Dickie did, and the ass-beating he received as a result made him the sweetheart he is today.

—DICK MATTHEWS, MCSE



ATI Throws a Curveball

ATI's next graphics chip will include a whiz-bang new technology called Truform that creates smooth curves from the lighting information that's already included for every vertex in a model.

Every polygon in a 3D model is described by three points, a.k.a. vertices. Each vertex in the model contains information about how light should react when it hits the polygon. It's possible to extrapolate curve data from this reflection information and essentially create several smaller triangles from an original large triangle. This creates a curvier surface.

It sounds great and should work with even the oldest games, but we worry that Truform might accidentally be applied willy-nilly, curving surfaces that should be straight. We'll keep you posted as we hear more from ATI, which should be announcing a brand-new chipset later this year.

FUN-SIZE NEWS

Motorola Pumps Up Palm

If your Palm OS device is too slow for your tastes, look to Motorola's upcoming DragonBall Super VZ chip. A sequel to the DragonBall VZ, the Super VZ doubles clockspeed to 66MHz and adds on-chip support for USB 2.0, on-chip SRAM cache, DMA memory transfers, and a frame buffer to speed up video. Its 0.18-micron shrink (down from 0.25-micron) should offer a two- to four-fold increase in speed and drink less power compared to the fastest Palm procs available today. The Super VZ will debut alongside the DragonBall MX1, which will be based on ARM technology and run at 200MHz.

Moore's Law Still on the Books

Proving that Moore's law still has some bite, Intel researchers have developed a transistor that could lead to 20GHz CPUs with 1 billion transistors. The CPUs' transistors would be just 20nm in size—that's 0.02 microns. Intel says that's about 30 percent smaller—and potentially 25 percent faster—than today's fastest transistors. All this mini-madness could become a reality by 2007.

Palm Gets Bluetooth

Bluetooth—the much-delayed, short-range, wireless technology—has finally made it to the Palm platform. Palm says it plans to have a Bluetooth card that fits into the Secure Digital expansion slot on the Palm M505 and M500 available by the end of this year. The tiny card will be slightly longer than an SD card in order to accommodate the necessary antenna. Palm says it has no plans to eliminate the IrDA port anytime soon.

Rambus Promises Loads of Bandwidth

Despite several negative court rulings against it, Rambus says it will increase its memory speed to 9.6GB/sec of bandwidth by 2005. By upping today's RDRAM speeds from a 16-bit interface at 800MHz to a 64-bit interface at 1200MHz, Rambus says its memory will far exceed what the PC industry expected. Rambus says the speed increase will require very minor changes in today's crop of RDRAM-based motherboards and memory. The company says intermediary speed increases of 1066MHz and 32-bit interfaces will be rolled out first.

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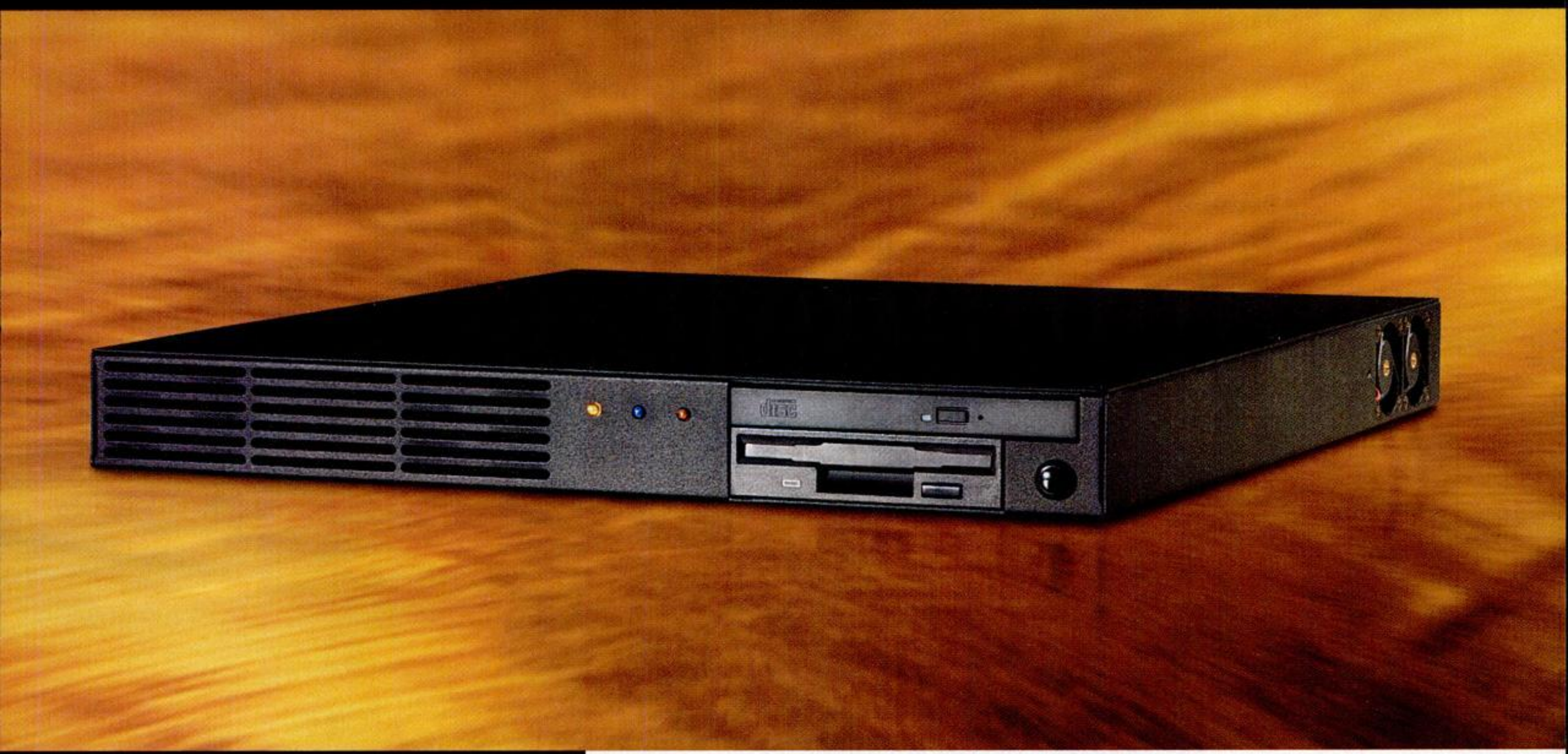

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The Profile of What's to Come.

Just as the 1U rackmount revolutionized the server market, the SleekLine 1000 Mini 1U computer combines compact size, integrated features, uncompromised performance, and exceptional value, to make bulky PCs a thing of the past.

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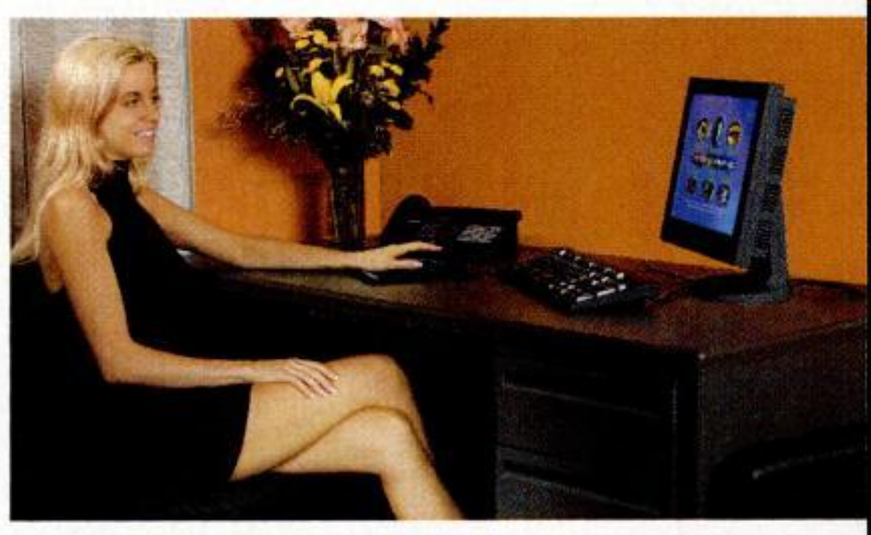

With its 1GHz Pentium III, built-in fast Ethernet, high-resolution graphics, and low-profile case, the handsome SleekLine 1000 is the perfect Internet machine, office workstation, or home entertainment computer.

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Head2Head

A showdown among natural PC competitors

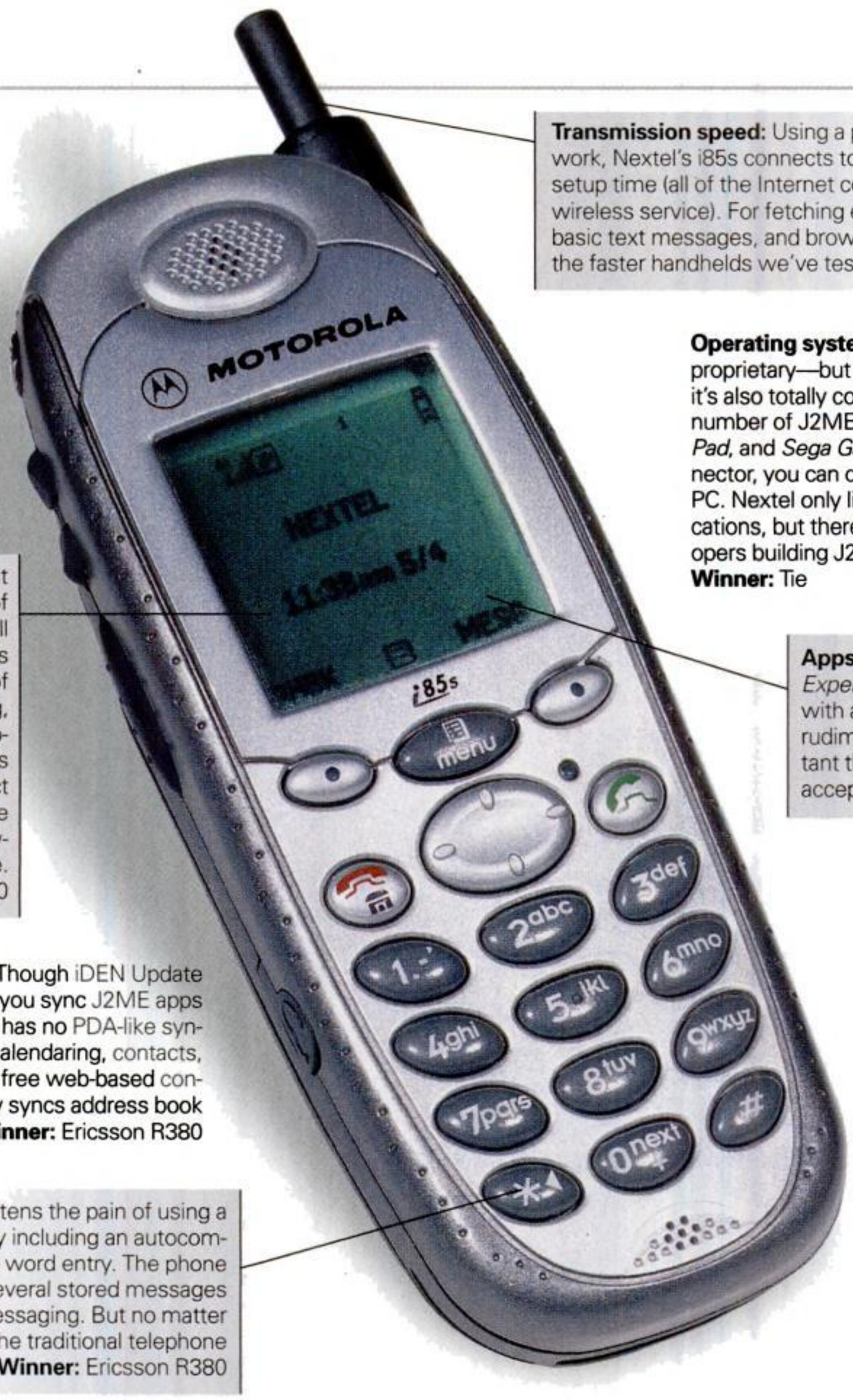
THIS MONTH: Cell Phone PDAs

PDAs were once nothing but electronic organizers, but they ultimately grew into do-everything wireless devices, complete with web browsing, e-mail support, and even modest cell phone capabilities. Cell phones, meanwhile, started out as mere mobile telephones, but are now meeting the most versatile PDAs halfway.

Ericsson brought the first such "smartphone" to the U.S. in the form of the R380, which uses a customized version of Symbian's EPOC OS. In a dramatically different take on the smartphone concept, Nextel loads Java-based PDA apps into a Motorola phone. These apps are authored in the Java 2 Micro Edition (J2ME) programming language, which offers handhelds compatibility with any device that runs one of the burgeoning varieties of Java. Let's have a look at the two competing phones to see which one packs the most features into the smallest space.

—ROB PRATT

NEXTEL I85S



Portability: The Nextel i85s is smaller than the Ericsson, and the way it fits in your hand is well-suited for entering data with your thumbs. Though it fits in all the places you might traditionally find a cell phone, its telescoping antenna is prone to slide from its locked position at the most inopportune moments. **Winner:** Nextel i85s

Transmission speed: Using a proprietary packet data network, Nextel's i85s connects to the Internet with minimal setup time (all of the Internet configuration is handled by the wireless service). For fetching e-mail, sending and receiving basic text messages, and browsing the web, the i85s is one of the faster handhelds we've tested. **Winner:** Nextel i85s

Operating system: The operating system is totally proprietary—but since it runs Java 2 Micro Edition, it's also totally configurable. Nextel preloads a number of J2ME apps, such as *Calculators*, *Expense Pad*, and *Sega Games*. With an add-on serial connector, you can download other applications from a PC. Nextel only lists seven available third-party applications, but there is a growing community of developers building J2ME apps for cell phones and PDAs. **Winner:** Tie

Screen: The 1.5-inch backlit LCD screen provides plenty of room for displaying typical cell phone functions, such as caller ID, carrier ID, time of day, etc. For web browsing, the six-line screen accommodates little more than news headlines, e-mail subject lines, and truncated web site menus. The typeface, however, is big and legible. **Winner:** Ericsson R380

Apps: Besides the J2ME apps *Calculators*, *Expense Pad*, and *Sega Games*, the Nextel comes with an e-mail client, a messaging client, and a rudimentary, text-only web browser. But the important thing about this smartphone is that it does accept third-party applications. **Winner:** Nextel i85s

Synchronization: Though iDEN Update upgrades the OS and lets you sync J2ME apps to the handset, the i85s has no PDA-like synchronization features for calendaring, contacts, and notes. Nextel offers a free web-based contacts service that wirelessly syncs address book listings to the i85s. **Winner:** Ericsson R380

Data entry: The i85s softens the pain of using a number pad for text entry by including an autocomplete function to speed up word entry. The phone also allows you to program several stored messages for use in e-mail or SMS messaging. But no matter how you cut it, text entry via the traditional telephone number pad is a pain. **Winner:** Ericsson R380

MAXIMUMPC VERDICT

Nextel i85s
NEXTEL

WHAT WE LIKE

The i85s is one of the quickest handheld web browsers we've tested. Even better, it loads pages that aren't WAP enabled.

WHAT WE HATE

Nextel says that the i85s will soon be able to download J2ME applications wirelessly—but who cares? There aren't many interesting J2ME applications available yet.

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5

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ERICSSON R380

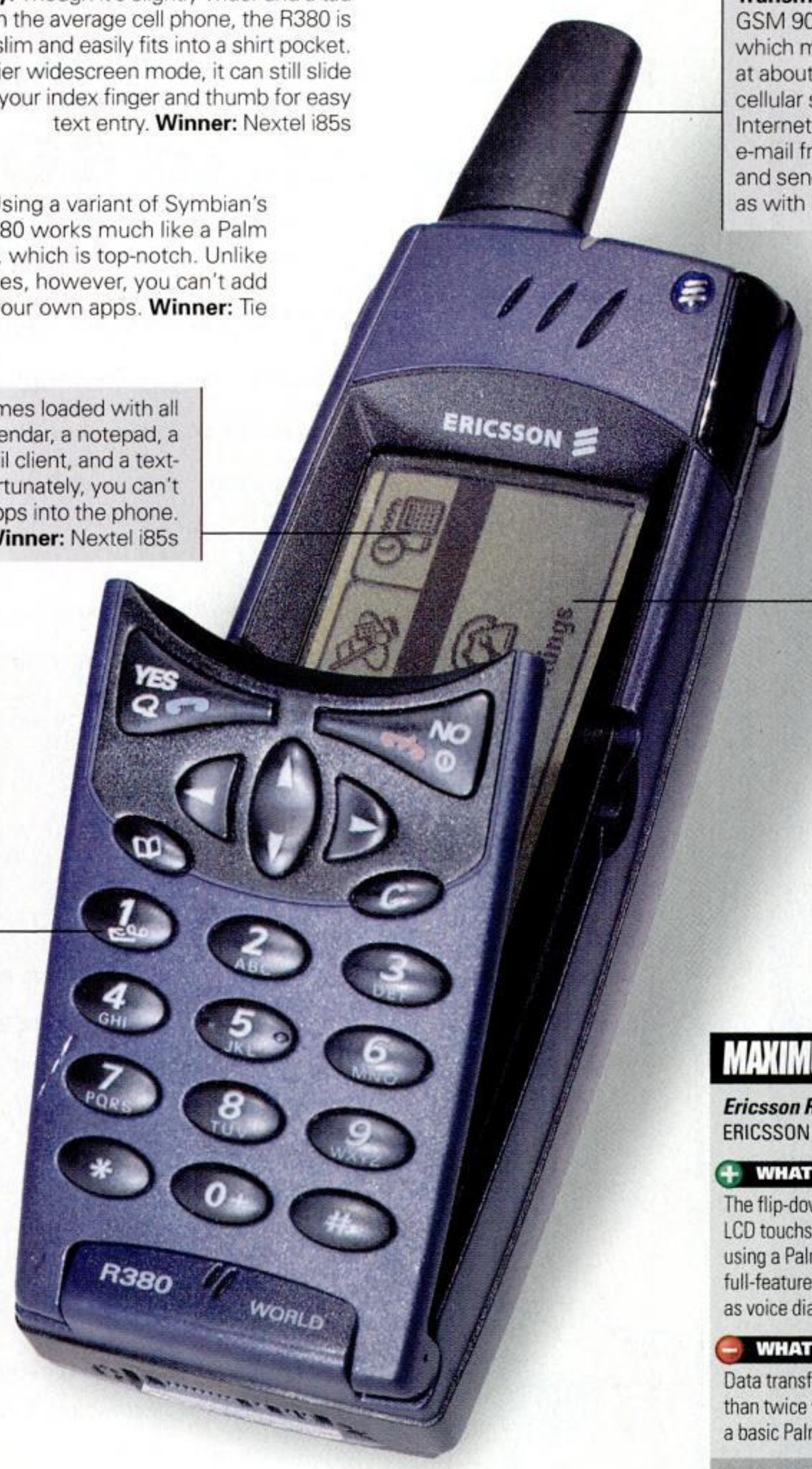
Portability: Though it's slightly wider and a tad heavier than the average cell phone, the R380 is extremely slim and easily fits into a shirt pocket. In the bulkier widescreen mode, it can still slide between your index finger and thumb for easy text entry. **Winner:** Nextel i85s

Operating system: Using a variant of Symbian's EPOC OS, the R380 works much like a Palm OS-based PDA, which is top-notch. Unlike Palm OS devices, however, you can't add your own apps. **Winner:** Tie

Apps: The EPOC OS comes loaded with all the wireless PDA basics: a calendar, a notepad, a contact database, an e-mail client, and a text-based/WAP web browser. Unfortunately, you can't load any additional apps into the phone. **Winner:** Nextel i85s

Data entry: Using a bundled stylus, you enter standard Roman-letter forms instead of the ersatz Graffiti alphabet required by the Palm OS. This method of data entry is light years ahead of the number-pad data entry required by the Nextel i85s. Graffiti sometimes has trouble recognizing the typical PC user's scrawl, but the R380's text-entry technology hardly ever flinched, reliably catching even sloppily entered letters. **Winner:** Ericsson R380

Synchronization: With a cradle and a serial cable connector, the R380 synchronizes with a PC almost exactly like PDAs that use Palm Desktop. Just define which parts of Microsoft *Outlook* and *Schedule+*, or Lotus *Notes* and *Organizer*, you want to sync, and the R380 software performs the sync automatically whenever you drop the unit into the cradle. **Winner:** Ericsson R380



ACTUAL SIZE

Transmission speed: The R380 uses standard GSM 900 and GSM 1900 cell phone networks, which means that data transmission only runs at about 9,600bps. Once you've configured your cellular service, you can next configure a dialup Internet account, then browse the web, download e-mail from multiple POP or IMAP mail accounts, and send rudimentary text messages, as with ICQ. **Winner:** Nextel i85s

Screen: This device features two screens. In phone mode, you use a small, square screen that's about average in size for a cell phone. This screen's text is tiny but legible, and a backlit LCD makes browsing e-mail headers and news headlines relatively easy. Just don't expect to get a lot of data without a lot of scrolling (the screen boasts just seven lines of small-type text). Once you flip down the phone keypad to enter PDA mode, you find a 4-inch backlit LCD touch screen. In this mode—which features seven lines of larger-type text—reading e-mail and browsing WAP-enabled web pages is only marginally more cramped than on a Palm or Handspring PDA. **Winner:** Ericsson R380

MAXIMUMPC VERDICT

Ericsson R380
ERICSSON

WHAT WE LIKE

The flip-down keypad that reveals a wide, backlit LCD touchscreen makes using the R380 almost like using a Palm OS-based PDA. But the R380 is also a full-featured cell phone with gee-whiz extras such as voice dialing.

WHAT WE HATE

Data transfer is painfully slow. And the price is more than twice what we'd pay for both a cell phone *and* a basic Palm OS PDA.

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7

THE UPSHOT

Despite the speed and convenience of Nextel's i85s, we prefer the Ericsson R380, with just one reservation—the Ericsson's steep price. It costs $600. For $300, we could buy a full-featured cell phone *and* a Palm OS-based PDA. Freeing up a little more space in our backpacks definitely isn't worth an additional $300. The smartphone category shows a lot of promise, but we have yet to see anything even remotely close to perfection.

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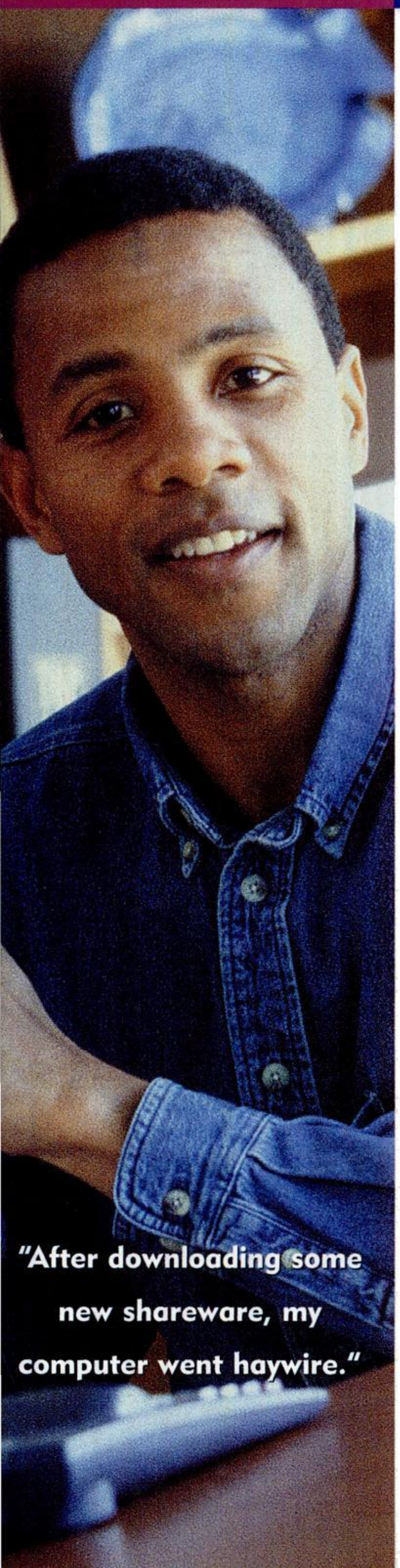

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WatchDog

Maximum PC takes a bite out of bad gear

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com**. The Dog promises to get to as many letters as possible, but only has four paws to work with.

This and That

Have you received an offer to renew your *Maximum PC* subscription for another four years? How about for *MacAddict* magazine, *PC Gamer*, or *PSM*? If so, The Dog would like to hear from you at watchdog@maximumpc.com. Please hang onto the renewal notice, as well as the cancelled check or credit card statement that shows the subscription has been paid for. Imagine Media, *Maximum PC*'s parent company, does not offer four-year subscriptions. We'd like your help in investigating some renewal-notice irregularities.

The Dog would also like to clear up some confusion over an item in the June issue regarding the recall of the 1.2 version of Iwill KK266 Athlon motherboards. An Iwill spokesman says that fewer than 1,000 of the boards were distributed, and the bulk of those have already been recalled. Also, because the problem only affected the overclocking abilities of the board and not the general functionality of it, the company continues to label its boards—now fixed—as 1.2. This has led to considerable confusion among consumers mulling over the purchase of the board. The official word from Iwill is that the 1.2 version of the KK266 board is safe to buy. More details on the issue are available in the support section at www.iwillusa.com.

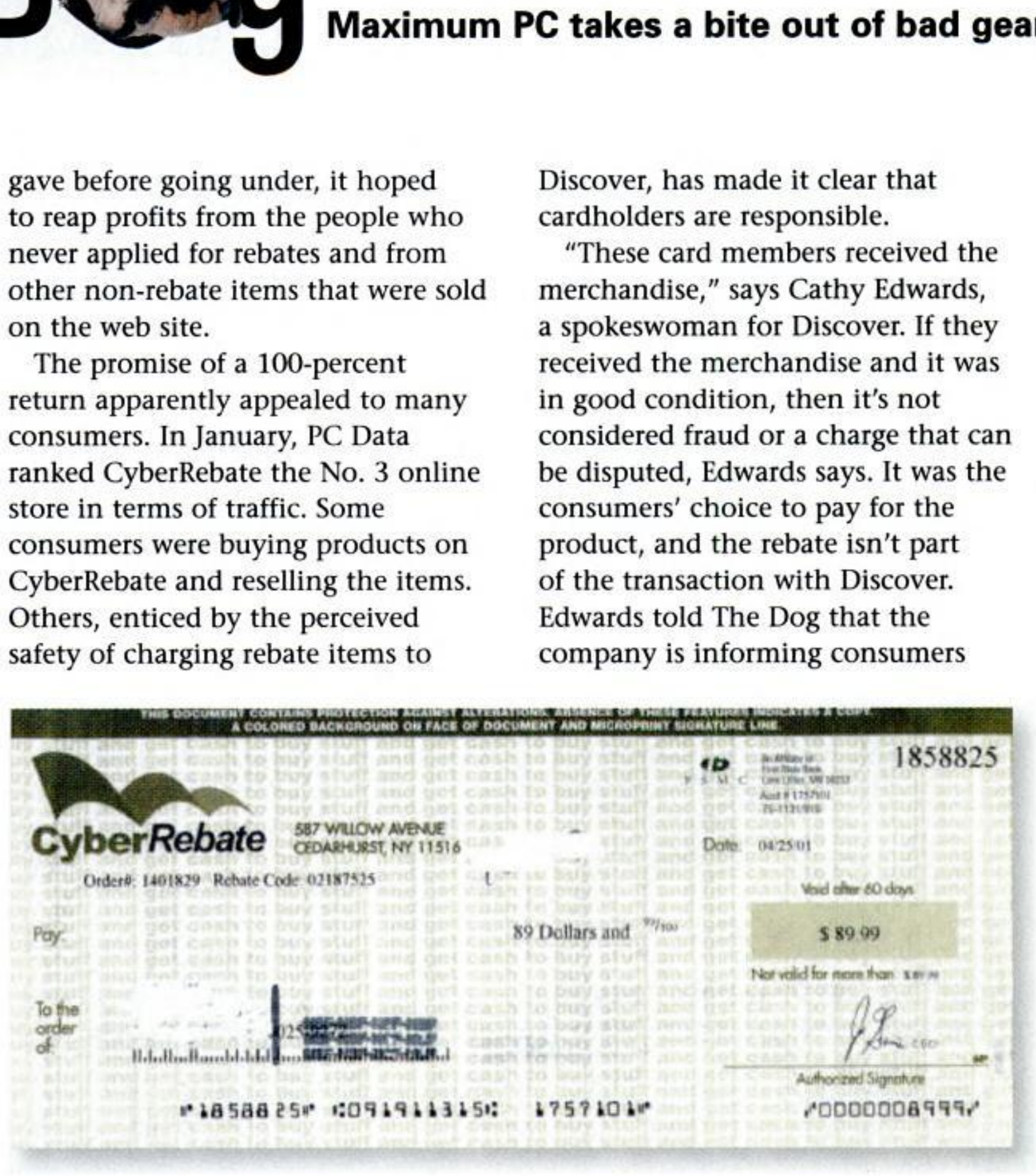
Nothing for Something

Here's a deal that may just be too good to be true. Instead of paying $200 for a stereo system, you pay $2,000. But in 10 to 14 weeks you'll get back 100 percent of what you paid in the form of a "rebate" check. Sound crazy? That's just what web store CyberRebate was offering consumers—up until May when it filed for bankruptcy, leaving hundreds, if not thousands, waiting for rebate checks that may never arrive.

CyberRebate, which had accumulated some $83 million in debt, filed for Chapter 11 bankruptcy protection in U.S. Bankruptcy Court, Eastern District of New York.

Just how could a company have expected to make money this way? According to interviews the company gave before going under, it hoped to reap profits from the people who never applied for rebates and from other non-rebate items that were sold on the web site.

The promise of a 100-percent return apparently appealed to many consumers. In January, PC Data ranked CyberRebate the No. 3 online store in terms of traffic. Some consumers were buying products on CyberRebate and reselling the items. Others, enticed by the perceived safety of charging rebate items to their credit cards, began regularly shopping at the web site. When CyberRebate melted down and rebate checks started bouncing, the "irrational exuberance" of the site's customers was exposed. One Virginia man was listed in CyberRebate's bankruptcy filing as being owed $115,650.23 in rebates. Several other consumers were owed as much as $70,000 to $80,000 in rebates.



Some of the checks CyberRebate sent its customers bounced higher than the Empire State Building.

The company left a terse message on its web site apologizing for filing bankruptcy and promising that "We are currently in the process of creating a plan to repay our customers and creditors. It is our intention to pay back as much as we can, hopefully up to 100 percent of what we may owe. More information will be made available as developments occur."

With $83 million in debt and just $24.5 million in assets, it's highly unlikely that all of CyberRebate's customers will get their cash. Consumers will also unlikely find shelter from their credit card companies. One such company, Discover, has made it clear that cardholders are responsible.

"These card members received the merchandise," says Cathy Edwards, a spokeswoman for Discover. If they received the merchandise and it was in good condition, then it's not considered fraud or a charge that can be disputed, Edwards says. It was the consumers' choice to pay for the product, and the rebate isn't part of the transaction with Discover. Edwards told The Dog that the company is informing consumers of the bankruptcy and advising them to file claims. Other credit card companies were still in the process of setting policy on the CyberRebate problem. Many people were out of luck anyway, as the 10- to 14-week wait for rebate checks put most people outside the 60-day time limit to dispute charges.

"I hope these people can be caught and prosecuted."

That's not the way San Francisco attorney Barry Himmelstein sees it, though. He's currently preparing a class-action suit against credit card companies on behalf of consumers.

"We think that under the Federal Truth in Lending Act there is a viable claim against the credit card companies to stand in the shoes of CyberRebate," Himmelstein told The Dog. To contact Himmelstein, visit his firm's web site at **www.lchb.com**.

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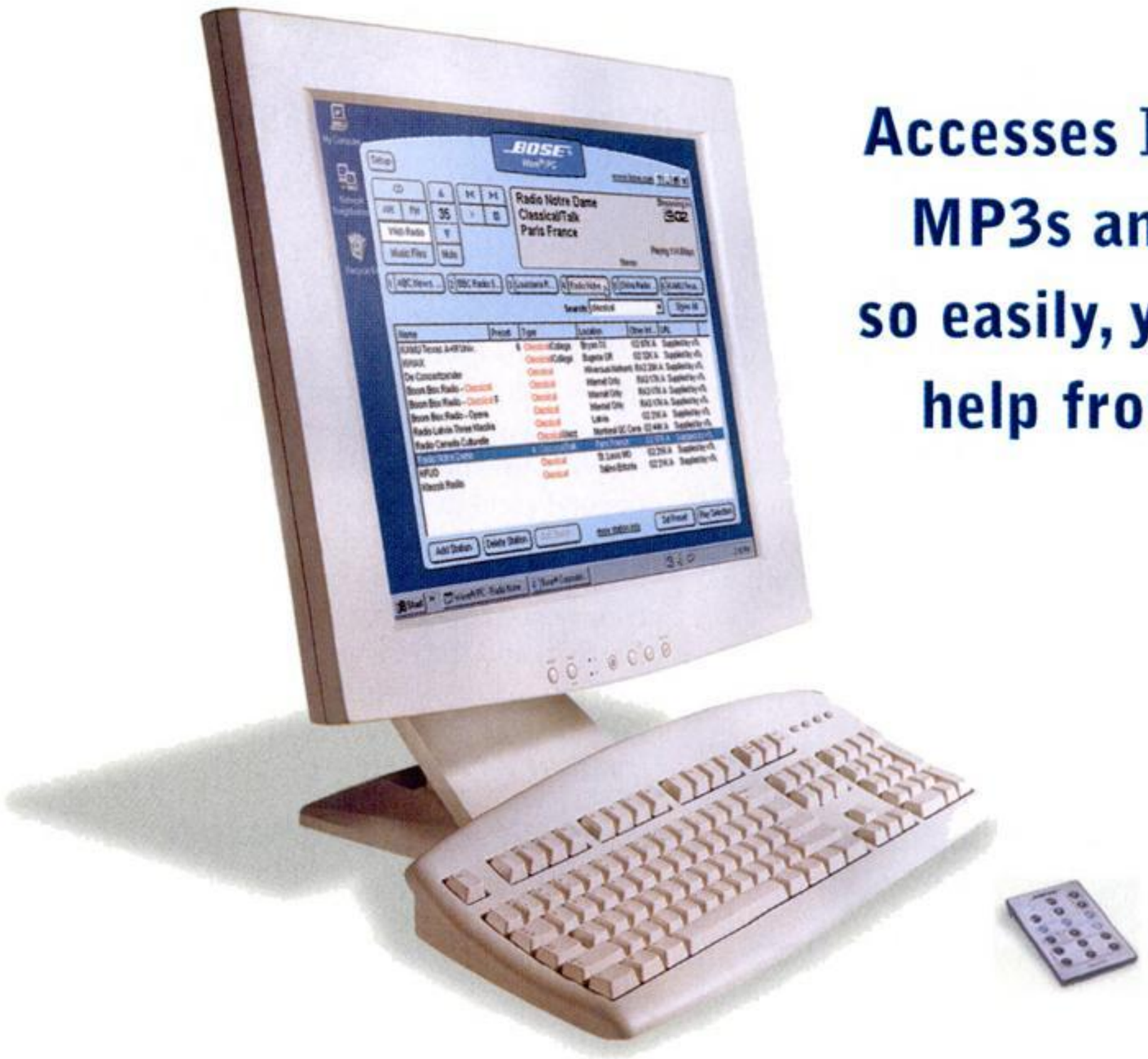

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Introducing the Wave/PC™ system. A revolutionary new product from Bose®.

You don't have to be young to make the most of your PC's musical capabilities. Because now there's the Wave/PC™ system. It doesn't matter if you're 7 or 70, the Wave/PC™ makes it easy for you to go from Web radio to MP3s to stored CDs at the touch of a button.

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You can listen to Web radio stations from around the world with the Wave/PC™ system. Its search feature lets you find the music you want quickly and easily. You can also download MP3 files through the Web and store them on your hard drive for later playback.

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Record your CDs on your hard drive, so all your music is easy to access. Never suffer through those songs on a CD you don't want to listen to again. The Wave/PC™ system lets you select your favorite songs and then file them on your PC. You can even make compilations of your favorite songs from different CDs.

System Includes:
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Audio Unit
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It's as easy as using the remote.

The Wave/PC™ comes with a remote that lets you go from Internet radio to MP3s to your stored CDs without ever interrupting what you're doing on your PC. Access preset Internet radio stations, music files and conventional AM/FM radio. With just a simple click of the remote, you can enjoy all the music you want on your PC.

All this, plus Bose quality sound.

To truly enjoy the variety of music you'll have access to, you need to hear it through a great-sounding music system. That's why the Wave/PC™ combines the power of your computer with the high-fidelity sound of acclaimed acoustic waveguide technology. So whether you're listening to Internet radio, MP3s or your stored CDs, you'll hear all your music in rich, room-filling sound.

Priced at $449, the Wave/PC™ system gives you endless music variety through your PC, along with the great sound you'd expect from Bose, all at the click of a remote. It's so easy to use, you don't have to be a kid to get it.

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Reader Larry LaBarge says he knows he probably won't be covered by his credit card company, but he's hoping for payback of another kind: "I don't consider myself the kind of person to get sucked into this kind of thing, but I really put my foot in it this time. I hope these people can be caught and prosecuted."

At least one agency is heeding that call. The Nassau County (N.Y.) District Attorney's Office confirmed that it is conducting an investigation into CyberRebate's business practices to determine whether there was any criminal fraud. Stephen Treglia, an assistant district attorney in Nassau County, where CyberRebate is headquartered, says the DA's office has received hundreds of complaints and expects the number to reach into the thousands. If you feel you've been burned by CyberRebate, contact the DA at **www.nassauda.org**. Other consumers have banded together at **http://communities.msn.com/CyberrebateRebateRecoveryAlliance**. There, CyberRebate customers post the latest news and commiserate on their situations. Check back here for CyberRebate updates.

V.Nothing

DEAR DOG: I am more than a bit upset with U.S. Robotics. I purchased four of USR's V.Everything Courier modems some years ago with the understanding that I would get any new updates with just a simple download. When U.S. Robotics began offering V.92 updates for its modems this year, I checked to see when the V.Everything would be updated and discovered that my model wasn't listed. After several discussions with USR, I was finally told that I have the "old" Courier modem and thus no upgrade will be available. My modem box plainly states that "USR designed Courier to be compatible with all popular protocols and ITU-T Standards, including those yet to be developed. So the Courier you buy today will continue to save you time and money far into the future. As new protocols and standards are completed, Flash ROM allows software upgrades to your Courier without even turning off your modem—let alone sending it away, so you can plug it in and forget about it."

What gives? I am sure the dozen or so USR V.Everythings my friends and I own are just a drop in the bucket of the number they sold. Is our loyalty to the brand not worth anything at all?

—Denyse Prescott

THE DOG RESPONDS: The Dog contacted U.S. Robotics about its V.Everything Courier modems. A spokesman says that the modems in question are very old and nothing on the boxes guarantees that upgrades would be offered forever. The spokesman also notes that all of USR's current V.90 modems are capable of being updated to support the slightly faster V.92 spec. U.S. Robotics says that it has initiated a policy of swapping the older modems for newer V.92 versions on a case-by-case basis. Is this the optimal solution? Not if you consider that the original ad copy on the box says "USR designed Courier to be compatible with all popular protocols and ITU-T Standards, including those *yet to be developed*." Of course, if every manufacturer lived up to the claims on the box, every game would be riveting, every utility would fix all problems, and Windows 98 would truly be faster and better. According to an attorney The Dog consulted, U.S. Robotics' accountability depends on whether the marketing was just standard ad puffing or an actual misrepresentation of the product. If you would like to contact U.S. Robotics regarding a V.Everything modem, call the company's main number at 877.710.0884.

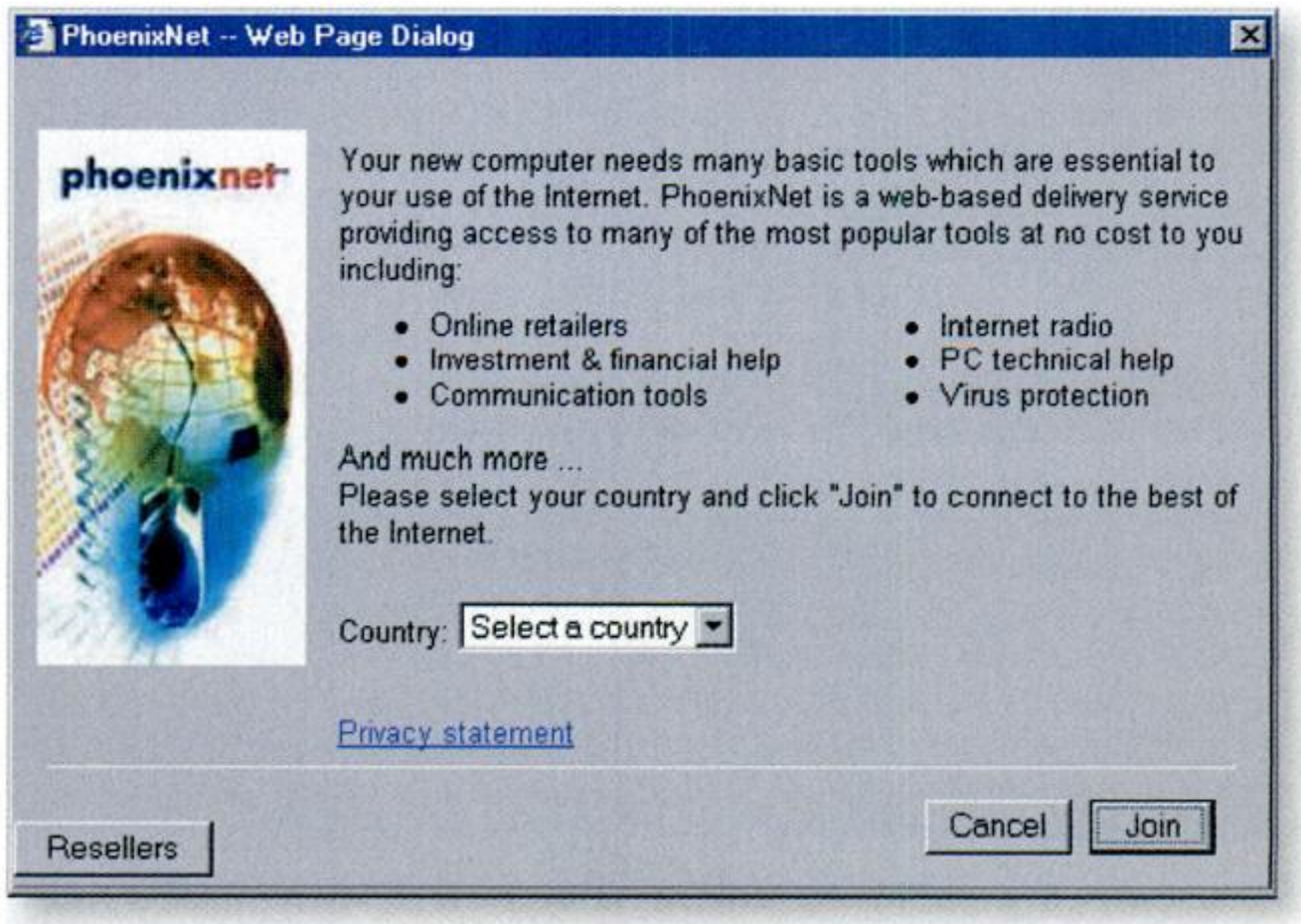
Is Your Motherboard Spying on You?

DEAR DOG: I recently ran into a problem during a rebuild of a PC. While installing a fresh copy of Windows 98, I ran into a dialog window that told me to install *PhoenixNet*. The program is described as an Internet utility. When I tried to quit the install or End Task it, my system locked up. After looking through newsgroups regarding this problem, I found that this application is stored in ROM on the motherboard, with a good majority of motherboard manufacturers supporting the application. I have not found a way to get rid of it yet. I'm hoping there is something The Dog can do to help in this matter.

I think this issue has just about gotten out of hand. Most users will have no idea what the software is doing. That is not right.

—Richard McClure

THE DOG RESPONDS: Phoenix officials say they are aware of consumers' concerns and explain that the program does not spy on consumers nor does it collect or send any information. The *PhoenixNet* software is embedded in a motherboard's firmware, and when detected by Windows 98, offers to set the user's home page to *PhoenixNet*'s servers. *PhoenixNet* is essentially a relic of the dot.com portal frenzy and mistaken belief that getting people to your web site has some value. The software is actually embedded in very few motherboards, and it's up to the motherboard manufacturer to implement it, the spokesman says. Phoenix officials say the company is a staunch advocate of privacy and has retained an independent privacy consultant to audit the company and ensure no privacy rights have been violated. Although it only pops up during installation of Windows (Linux, Be, and other alt OSes are immune to it), there is no easy way to remove it. On the one hand, it's good to know that the program isn't truly spyware, but it's also annoying and downright creepy to know that a program was inserted into the hardware of a motherboard. A bite on the ass goes to Phoenix for even dreaming up such a silly scheme. ■


PhoenixNet -- Web Page Dialog
phoenixnet
Your new computer needs many basic tools which are essential to your use of the Internet. PhoenixNet is a web-based delivery service providing access to many of the most popular tools at no cost to you including:
Online retailers
Investment & financial help
Communication tools
Internet radio
PC technical help
Virus protection
And much more ...
Please select your country and click "Join" to connect to the best of the Internet.
Country: Select a country
Privacy statement
Resellers
Cancel
Join

Some motherboards have software embedded in their hardware that tries to point you to certain web sites.

ULTIMATE UPG

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Thou shalt not accept inferior PC performance—so it's time to rip open your case and unleash the dormant power that lies within. We present our definitive guide to upgrading all your PC subsystems, part by righteous part.

By the *Maximum PC* staff

PHOTOGRAPHY BY ARNOLD TIOSEJO

So close, but yet so far. Sounds like your life story as a power user, doesn't it? When you originally configured your own personal dream machine, all your PC subsystems were kick-ass from top to bottom. But then you commenced a hopeless game of catch-up as cruel technological progress stepped in and began rendering your components obsolete. First your CD burner was roundly kicked in the buttocks by a new generation of optical drives. Then your favorite speaker company released an update that was scientifically proven to induce incontinence in lab rats. And then your CPU—so fleet of frequency when you first purchased it—was eclipsed by a new processor design that enabled clock speeds beyond the scope of metaphysical comprehension.

So do you throw your hands up and surrender? Never! You *can* beat your technological demons (at least for a couple of months—we are talking about *PC* upgrading, after all). Just read this trusty guide, then unleash the dogs of war. Our lesson starts with general, common-sense tips. Then we'll move on to specific suggestions for upgrading each PC subsystem. We end with the 10 Upgrading Commandments.

UNIVERSAL TRUTHS

• A smart hardware hacker begins by identifying application-specific bottlenecks, and then upgrades accordingly. To wit:

Today's most intense 3D games just won't run well with CPUs slower than 700MHz or videocards that are less advanced than the 3Dfx Voodoo3 or nVidia TNT2. That stated, just remember that upcoming DirectX 8 games (which should begin appearing in force by 2002) will not be very CPU-dependent but will definitely require a good DirectX 8 videocard, like those based on the GeForce3 chipset.

Intense media-editing apps such as *Photoshop* (for image editing), *Premiere* (for video editing), and *SoundForge* (for audio editing) need fast CPUs and hard drives. Your CPU crunches the actual editing algorithms, while your hard drive transfers large chunks of data to and from main system memory. Almost every media-editing app can also use large chunks of system memory. We've found that Windows 95/98/ME apps can keep making productive use of RAM until you exceed 256MB. For Windows 2000, the point of diminishing returns doesn't rear its head until you exceed 384MB.

If you simply surf the web and process words, you don't need to upgrade. Stop reading this article, and start reading our Ask the Doctor section, where you can learn to fix the PC configuration you already own.

• Before buying any new component, make sure it will play nice with your motherboard. To find this compatibility information, start with your mobo manual, then visit the web site of your mobo manufacturer for technical bulletins. Finally, you should ask the upgrading nuts at our reader forums (www.maximumpc.com) for advice on the pluses and minuses of specific hardware combinations. Obviously, your motherboard will only support specific CPUs and memory types. But many mobos also have "known issues" with various videocards, RAID con-

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RADE BIBLE

trollers, and just about anything that might plug into a PCI slot.

• Download any necessary drivers *before* you dismantle your PC. A PC that can't properly boot because it lacks the necessary hardware drivers is a PC that can't connect to the Internet to download the necessary hardware drivers.

• Follow the proper installation sequence if you're rebuilding a system from scratch: After you install your OS, immediately install your mobo chipset drivers, then install your individual device drivers, one by one.

• Before you wipe a hard drive clean, save your Internet connection settings. If you're a dial-up modem user, you can simply drag the proper Dial-Up Networking icon to a floppy disc; this will save all your settings. If you're a DSL or cable modem user, jot down all the network settings associated with your NIC and contact your ISP for your PPoE information.

Feeling a bit more confident now? Splendid. Turn the page for the latest news on videocards and everything else in the big, bold product universe.

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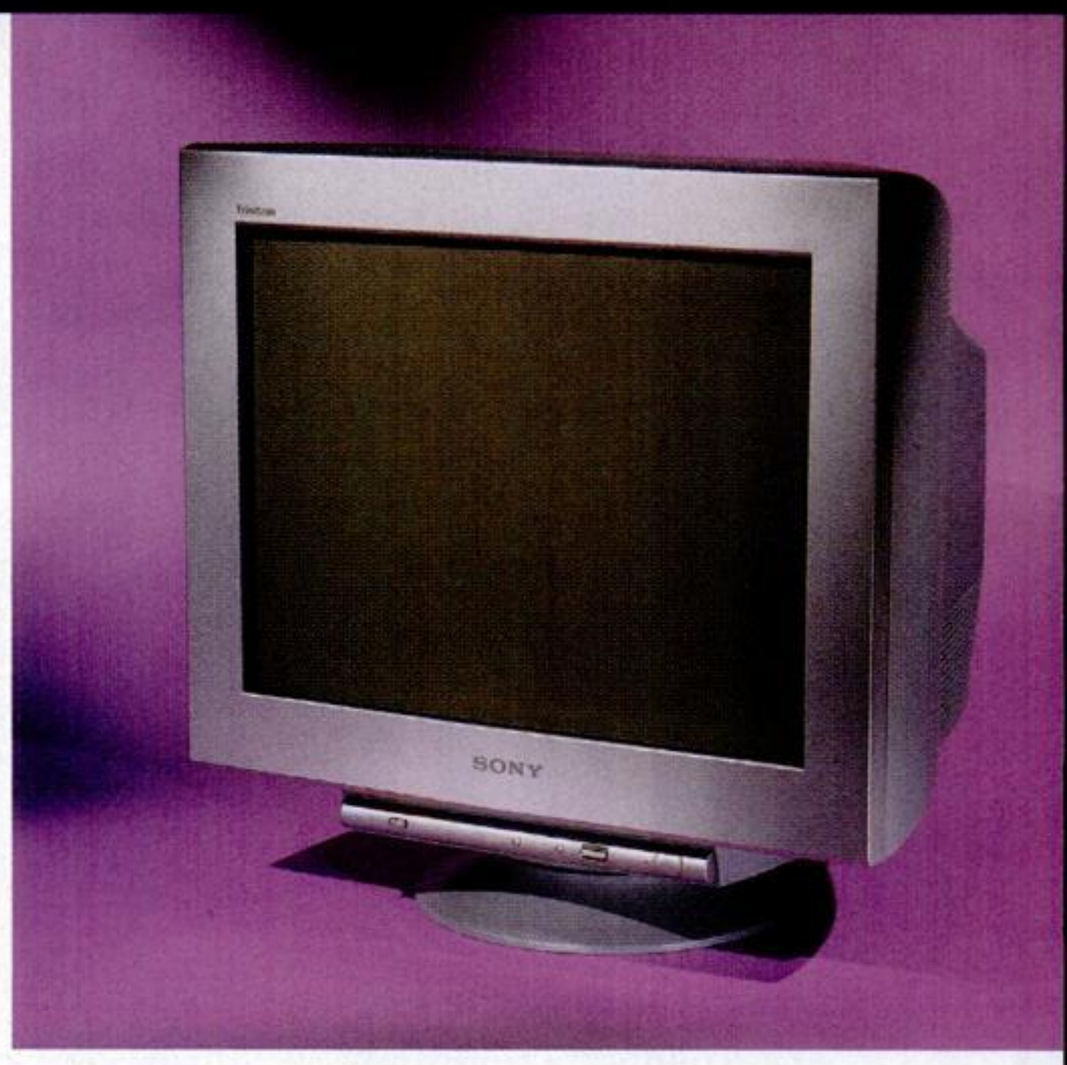
MONITORS

Our monitor choice was based on a process of elimination. First, we tossed out all CRTs smaller than 21 inches—because not even 19-inchers are truly "ultimate." Second, we discarded all shadow-mask displays—because they're simply not as bright and brilliant as their aperture-grille cousins. Third, we ruled out monitors from companies that merely commission tubes from original technology manufacturers, slap some plastic around these CRTs, and call the monitors their own. After all, if we're going to buy a Ferrari engine, we want that engine in a Ferrari, not in some car from a company that might cut corners when mating such an awesome power plant with alien machinery. So we were left with just two displays: the **Sony F520** ($1,500, **www.sonystyle.com**) and the **NEC FP1375X** ($1,000, **www.necmitsubishi.com**). We chose the Sony, but rest assured, both monitors are sublime.

Perfectly flat—as any respectable CRT should be—the F520 offers an insanely high top resolution of 2048x1536, and can hit a silly-fast refresh rate of 85Hz at 1920x1440. But what pushes the F520 over the edge (and past the FP1375X) is its industry-leading 0.22mm grille pitch, which fosters the sharpest, highest-detail screen image you will ever see in a desktop display. Words simply cannot describe the F520's precision detailing. The FP1375X is also perfectly flat, but it hits just 80Hz at 1920x1440, and its grille pitch is slightly coarser at 0.24mm.

You'll be happy to know that both displays appear to have beaten the geometric distortion bugs found in previous 21-inch, perfectly-flat CRTs (more about this in next month's reviews section). So where's Mitsubishi in this upgrading fracas? The esteemed display manufacturer has actually merged with NEC, and, as a unified company, NEC/Mitsubishi is pushing the FP1375X as its F520 killer.



Monitor **Sony's F520 trumps the F500 with a higher resolution—2048x1536, if you're keeping track.**

TRUSTY BUDGET ALTERNATIVE

Even a Ford can run fast with a Ferrari engine—so if you want to save money and still score an awesome display, look for monitors that use **Sony** and **NEC/Mitsubishi** tubes. Displays with a 0.22mm pitch use Sony tubes, while displays with a 0.24mm pitch use NEC/Mitsubishi. You'll save some dough but possibly give up ultimate refresh rates, build quality, and certain onscreen controls.

HARD DRIVES

Thanks to ever-increasing capacities and plummeting prices for storage upgrades, it's not uncommon to find 60GB drives for under $150. But with today's processors quickly approaching warp speed, hard-drive transfer rates compete with bus speeds for the title of most persistent bottleneck in desktop systems. So our first choice for giving your PC a roomy new wing goes to the **IBM 60GB 60GXP** ($185, **www.ibm.com**), the newest addition to the Deskstar series. The 7200rpm 60GXP sports the industry's highest areal density for a desktop drive, packing 60GB on just three platters—a 25 percent increase in density over its predecessor, the 75GXP. The higher the areal density of a drive, the less the drive heads have to thrash about looking for information or writing files in non-contiguous blocks—and this results in increased transfer rates, faster spinup times, and lower power consumption.

In our *HD Tach* benchmarks, the access time for the 60GXP dropped to 8.3ms, down from the 12.7ms average of the 75GXP. The 60GXP also returned an average transfer rate of 38.4MB/sec, a 30 percent increase over the same test on the 75GXP! This may be a far cry from the 100MB/sec burst rate boasted by the ATA-100 interface used by the 60GXP, but these burst rates are rarely achieved by any drive.

Professionals who use data-transfer-intensive applications such as video editing might naturally gravitate toward pricey 15,000rpm SCSI drives, but we recommend taking a look at IDE RAID 0 first. RAID 0 writes data across multiple drives simultaneously, a process known as "striping" that results in significant increases in sustained transfer rates ("sustained" transfer rates are always more important than "peak" transfer rates when it comes to sound and video editing). Striping two 60GXPs using the **Promise FastTrak 100 TX2** ($100, **www.promise.com**) boosted the average transfer rate to 45.5MB/sec, whupping the performance of the 15,000rpm Seagate X15 Ultra160 by nearly 10MB/sec for hundreds of dollars less.

Hard Drive **IBM's new drive boasts 15 fewer gigs but is faster than the hallowed 75GXP.**

TRUSTY BUDGET ALTERNATIVE

Budget-minded folks can cash in now that **IBM**'s venerable **75GXP** has taken a backseat to its faster sibling. You can now find the 75GXP at prices hovering around $120 for 30GB, and enjoy the fast, sustained transfer rates of IBM's drives that other "value" drives just can't offer.

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VIDEOCARDS

There are very few things that a gamer actually "needs"—a healthy supply of junk food, a reliable connection to the net, a fast PC, and that's about it. But the secret sauce that turns a fast PC into a fast *gaming* PC is its 3D accelerator.

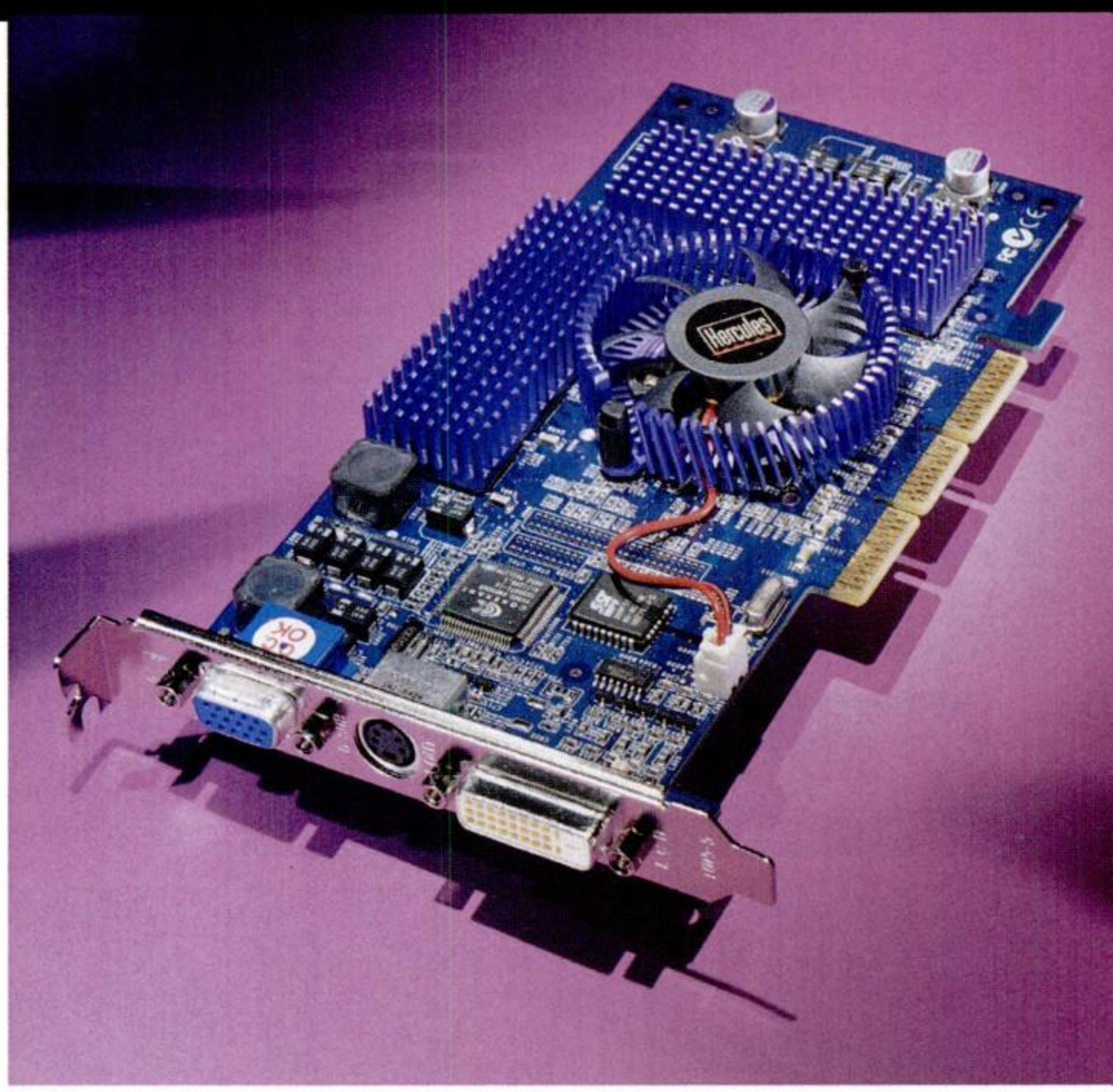
Today, there's only one indisputable choice for 3D acceleration, and that's the GeForce3.

This chipset is based on the same technology that will eventually power Microsoft's Xbox gaming console. Unlike earlier 3D accelerators—which just draw 3D scenes described by the CPU—the GeForce3 can perform CPU-like duties, manipulating everything about a 3D image. This means the chip can process everything from the setup of vertices to the opacity of a polygon, and even pull off tricks like reflection and refraction, which occur when light hits a model. This programmability allows game developers to create absolutely amazing 3D worlds—once they begin taking advantage of these features. The first PC titles that leverage GeForce3 power will be ports from the Xbox, arriving this November. See last month's "Now *This* Is 3D Gaming" feature if you want proof of how awesome the GeForce3's graphics can be.

So which GeForce3-based card should you buy? Quite frankly, it doesn't matter. All of the GeForce3-based cards that we've tested perform identically. In fact, the sole defining feature of most GeForce3 cards is the presence (or absence) of a DVI output for LCD flat-panel support. We've reviewed cards from **Visiontek** ($400, **www.visiontek.com**), **Elsa** ($400, **www.elsa.com**), and **Hercules** ($430, **www.hercules.com**), and would recommend any one of them. Unless you want a specific piece of software bundled with one of these cards, we recommend that you simply purchase the cheapest one.

Not everyone plays games, though, and there are plenty of videocards for all the budding Cecil B. DeMilles who want to play with moving pictures. Do-everything wonder cards—such as the **Matrox Marvel G450 eTV** ($230, **www.matrox.com**) and the **ATI All-in-Wonder Radeon** ($280, **www.ati.com**)—are great for anyone who wants to capture video or simply watch TV on his or her PC. We think that the Matrox's video-capture is superior to ATI's, providing more vibrant colors and suffering fewer compression artifacts. The do-everything cards also provide TiVo-like PVR functionality, so you can record TV shows directly to your PC's hard drive and even pause and rewind live TV broadcasts.

The only real problem with the Marvel and All-in-Wonder cards is their 3D performance. While the All-in-Wonder provides decent enough 3D acceleration (courtesy of the Radeon graphics chip), the Marvel's 3D core scored abysmally low in all of our 3D benchmarks. If you're solely interested in video quality and have no 3D gaming desires, grab a Marvel. You won't be disappointed. If you want the best of both worlds, check out the All-in-Wonder.



Videocard **Who can resist the snazzy allure of Hercules' fancy active cooling?**

It's a good time to buy a videocard, as there are choices guaranteed to suit everyone. Gamers get breathtaking visuals with their GeForce3 boards, while videophiles get great analog video-capture with their Marvel G450 eTVs. New videocards for all!

TRUSTY BUDGET ALTERNATIVE

While any of the GeForce3 boards will fulfill your desire for powerful programmable shaders, not everyone wants to shell out $400 for a videocard. If you fall in this camp, you should check out budget alternatives based on the GeForce2 MX-400 chip—the **Leadtek Winfast GeForce2 SH MAX** costs about $150. So what's the difference between a GeForce2 MX-400-based card and a more costly GeForce2-based card? Not much. GeForce2 cards simply come with either faster memory or a wider memory bit path.

Also, since the release of the GeForce3, boards based on GeForce2 chips have dropped to around $175. These boards are faster than MX boards but don't provide the advanced programmable shader features of the GeForce3. Whichever route you go, just remember that even an MX-400-based card will still be faster than any videocard available two years ago.

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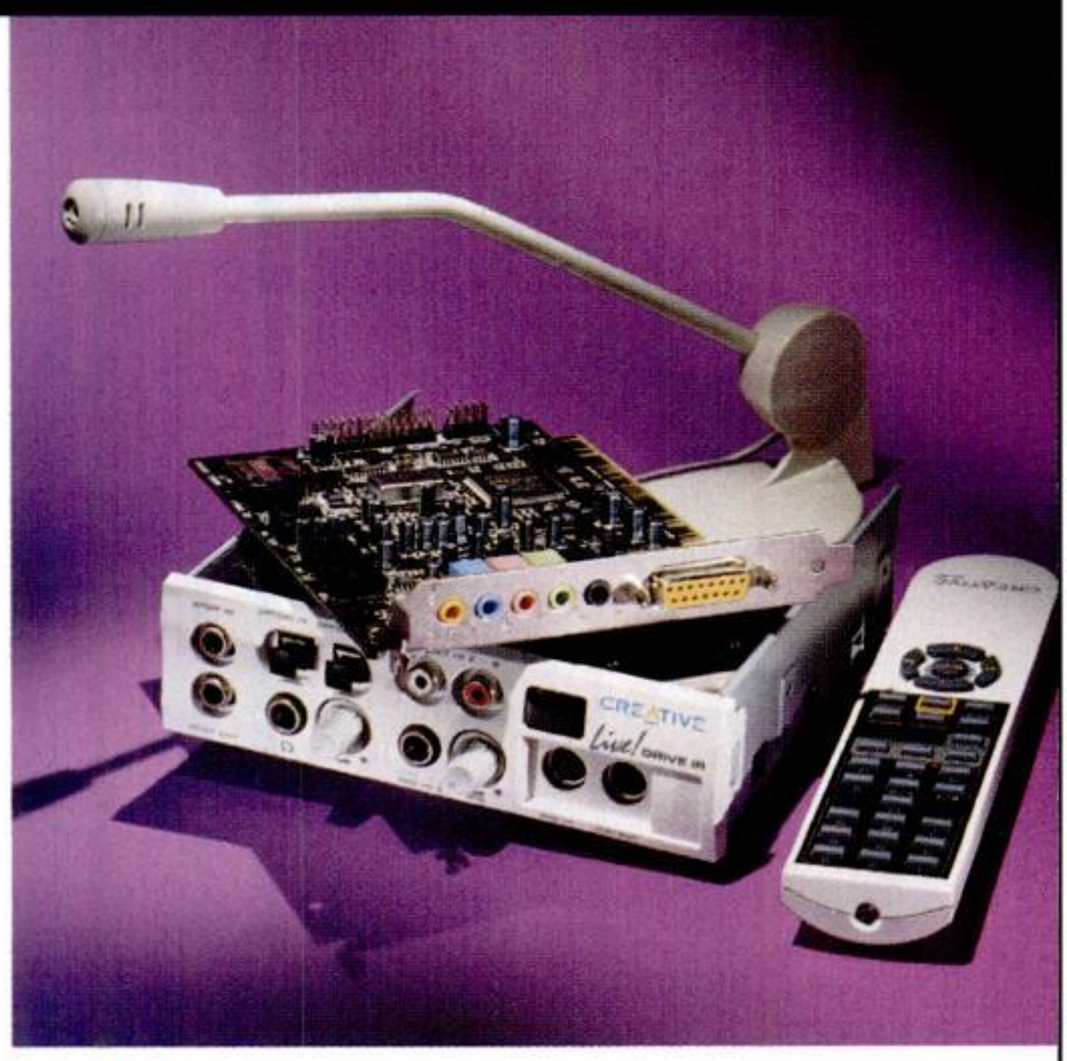
SOUNDCARDS

The original Sound Blaster soundcard essentially established the PC as a viable gaming and entertainment platform. In fact, without Creative Labs' initial jump-start, PCs might still be viewed as number-crunching office machinery. The **Sound Blaster Live! Platinum 5.1** ($200, **www.soundblaster.com**) builds on the **Creative Labs** legacy, and then some.

The Live! 5.1 uses the power we've already got in our modern CPUs along with its own sophisticated digital signal processor, the EMU10K1, to make once-extravagant audio systems and music production setups commonplace. Other companies have offered similar (and sometimes even better) technologies, but much of Creative Labs' innovation lies in making the technology accessible and fun. One of the most useful aspects of the Live! Platinum 5.1 package is the Live! Drive IR breakout box, which puts a suite of analog and digital connectors into a drive bay that installs in the front of your PC. With this box, you can pipe in your own audio through standard RCA jacks, send digital audio to your MiniDisc player, and control the sophisticated hardware synthesizers embedded in the soundcard with any MIDI keyboard. There's even an infrared port for remote control of your PC's audio and video players.

The Live! Platinum 5.1 also provides four-point surround sound for games that support it, as well as Creative Labs' signature EAX environmental sound. The addition of a Dolby Digital decoder for output to 5.1 speakers shows that when it comes to taking advantage of the multimedia possibilities already present in desktop systems, Creative Labs gets it.

The **Hercules Game Theater XP** ($150, **www.hercules.com**) is David to the Live!'s Goliath. The Crystal CS4630 chip at the heart of this card offers slightly higher bitrates than the EMU10K1 and produces sound that seems somewhat more cinematic to our discerning ears. The Game Theater XP also offers a four-port USB hub on its breakout box.



Soundcards **Creative Labs' Live! Drive breakout box pushes the Live! bundle over the edge.**

TRUSTY BUDGET ALTERNATIVE

You might find much happiness in **Sound Blaster PCI 512** from **Creative Labs**, a card we've seen for under $60. You'll still get the EMU10K1 chip and hardware support for EAX, but not the Live! Drive or the massive software bundle.

OPTICAL DRIVES

Even though it's no longer the speed champion it once was—its burn speed is now eclipsed by 20x drives from Ricoh and Yamaha—the fact that the **Plextor 16x10x40x** ($250, **www.plextor.com**) is still our pick for the ultimate optical drive upgrade is a testament to its great engineering, functionality, and price.

With sustained 16x write times and updated firmware, our trusty Plextor drive wrote 647MB of data in 5:07, and digital audio extraction peaked at 31x, ripping 72 minutes of CD audio in 3:15. This is a mere 16 and 15 seconds slower, respectively, than the Yamaha 20x. But where other drive manufacturers are stumbling over each other trying to advertise the highest "x" speed, Plextor emphasizes no-gimmicks quality and smart engineering.

Despite the cockpit-shaking speeds it achieves, a vibration-dampening shell makes this one of the quietest drives we've ever tested, while the back-mounted fan is a fine touch that straddles the fence between prudence and overkill. And paired with *CloneCD*, we've yet to encounter a disc it couldn't back up, copy protection or not. (FYI: Backups were promptly destroyed by snapping the CD in two, something we don't recommend—ouch!) Reading and writing are performed without hiccups or anomalous behavior; we can't say that about the Yamaha 20x.

The **Yamaha 20x** ($250, **www.buyyamaha.com**)is still the speed champ here, with its record-breaking digital audio extraction and read/write speeds (see the full review on page 60), and we don't hesitate to recommend it for speed freaks. But until some of the kinks get ironed out, we feel more confident about the Plextor 16x.

Meanwhile, things are looking very bright for TDK. It's got a 24x drive and 24x media in the works, and is preparing to introduce MultiLevel technology that may triple CD speed and capacities, though the disks themselves will not be readable in traditional drives.

Optical Drive **OK, so Plextor's burner can't claim the fastest recording speeds. It's still the best overall.**

TRUSTY BUDGET ALTERNATIVE

If you'd like to save a few bucks that can later be funneled into "soft money" contributions to political candidates, you can get the excellent **TDK 12x10x32x** ($170, www.tdk.com), which incorporates Burn Proof buffer-underrun protection and also has a generous software suite including *Nero* and *MusicMatch Jukebox*.

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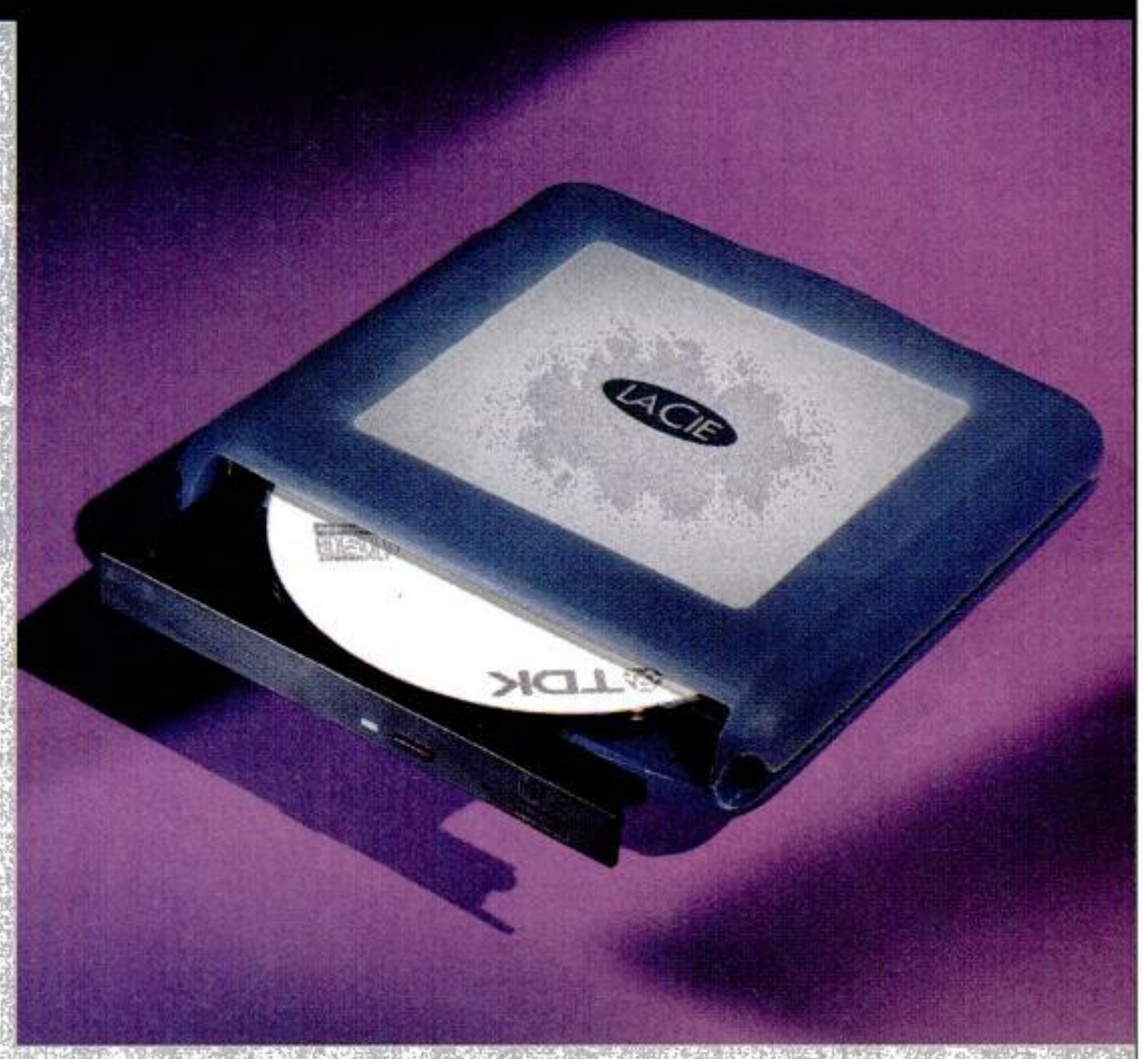
REMOVABLE MEDIA

Depending on how you look at it, today's removable media scene offers either a plethora of innovative solutions and formats or a nightmare of incompatible standards that will ultimately lead nowhere. But there's a simple solution that's so ubiquitous, it's easy to forget how useful it really is. It's fast, cheap, portable, and durable. You can format it for "packet writing" and use it like a floppy. And everyone and their mama has the ability to read it. It's CD-R.

CD burners used to be expensive and of dubious quality, and the software that came with them was even worse. But today's burners can be had for under $200, and buffer-underrun technologies like Burn Proof have made coasters a thing of the past. And next-generation CD-burning applications such as Oak Technologies' *SimpliCD* makes burning as familiar as using Windows Explorer.

Still, we do like having choices, and we like carrying around sexy devices that start conversations. About the only high-capacity media out there that's truly ubiquitous enough to be useful is Iomega's Zip format. But despite its small size and popularity, Zip media remains expensive at $10 for a 100MB disc, and droopy average speeds of 1.2MB/sec and limited capacity won't cut it for heavy use. Iomega is trying to reclaim the removable media throne with its new **20GB external USB Peerless drive** ($400, **www.iomega.com**), but it's expensive and bulky, and USB is just too slow for transferring gigabyte capacities.

Portable FireWire drives, on the other hand, get our attention. LaCie's sleek, small, and rubbery **PocketDrive** ($580 for 30GB) and **PocketDrive 8x4x20x CD-RW** ($400, **www.lacie.com**) offer both USB and FireWire connectors, which is becoming something of a tradition in LaCie's external devices. They're fairly expensive, and the 8x drive won't outrun your internal CD-RW drive, but slipping these babies in your pocket won't leave you stranded with a plug that's got nowhere to go.



Removable Media **Make CD-RW, USB, and FireWire your travelling companions with the PocketDrive CD-RW.**

TRUSTY BUDGET ALTERNATIVE

It's a budget solution you want? Stick with floppies. We're not kidding. No one's managed to bridge the gap between the feeble 1.44MB floppy and the Zip drive. That is, unless you want to upload your files for transport to a Yahoo briefcase—while it lasts.

INPUT DEVICES

In the mousing arena, we like the **Cordless MouseMan Optical** from **Logitech** ($70, **www.logitech.com**), which is completely untethered (i.e., no messy cabling) and utterly ball-less (i.e., no grimy build-up can slow down your deskapades). Because it uses a high-definition optical sensor to define your cursor's position on the desktop, the MouseMan is ideal for precision image-editing applications. But unfortunately, because it uses batteries, there are certain instances when the MouseMan automatically scales back the refresh rate (to preserve battery life), thereby causing a degree of lag. The latency is imperceptible in Windows apps, but makes the mouse less than ideal for fast-paced gaming.

For gaming, nothing beats the **Logitech iFeel Mouse** ($40). It boasts a symmetrical design that's ergonomic for both righties and lefties and uses an optical sensor just like the MouseMan. But unlike the cordless MouseMan, this mouse includes force-feedback "iFeel" support. In iFeel-enabled games—which include most first-person shooters released in the past six months, as well as *Unreal Tournament*, *Half-Life*, and *Black & White*—iFeel can add a new dimension to your immersive experience. All in all, we liked the subtle clicks, taps, and vibrations.

When it comes to keyboards, the world is generally divided into two camps: "hunt-and-peckers" who prefer normal-looking, traditional boards, and "touch typists" who have somehow found happiness in absurd-looking ergonomic boards. For the kooky, suspiciously Mac-centric ergo crowd, we like the **Microsoft Natural Keyboard Pro** ($75, **www.microsoft.com**). Its layout puts your wrists in the proper ergo position, and its 19 hot keys can save you a lot of keystrokes and mouse clicks when web browsing or working with e-mail. For the traditional keyboard crowd, go with the **Key Tronic E06101 USB-C** ($43, **www.keytronic.com**). It has a no-nonsense layout and very smooth button action. Both keyboards come with two USB ports.

Input Devices **Skitering around completely untethered, the MouseMan Optical won't busy up your desk.**

GETTING A GRIP ON GAMES

Loaded with smart engineering, the **Microsoft SideWinder Force Feedback 2** ($109, www.microsoft.com) is a generation ahead of other joysticks. First, the power supply is integrated into the base. Second, its force-feedback conveys the kick of a gun or the pull of a plane without overbearing vibration. Third, the button layout works for righties and lefties.

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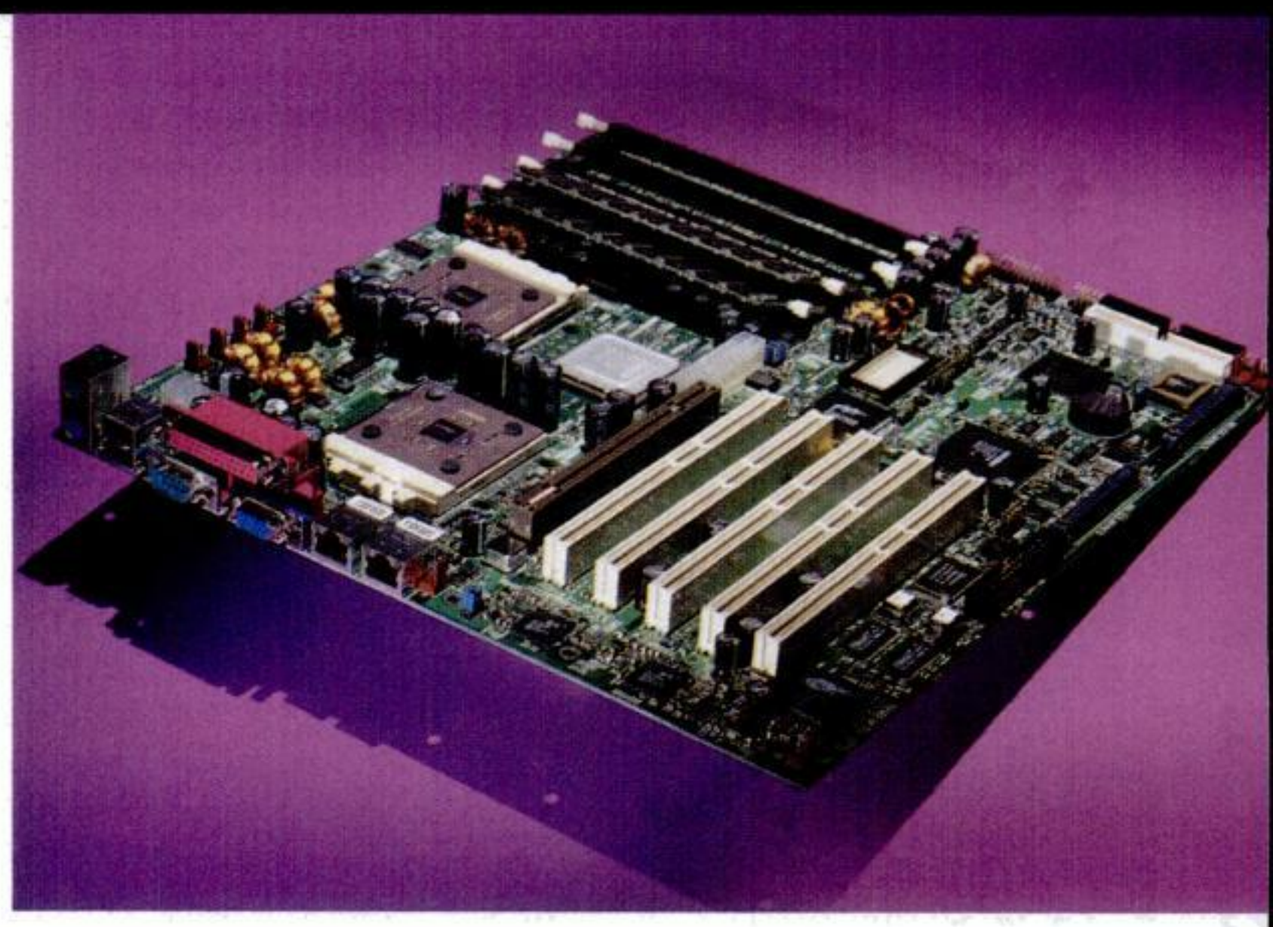
CPUs AND MOBOs

Thinking about upgrading your Pentium II system to an Athlon? How about adding DDR memory to your Pentium 4 rig? Fugeddaboudit. In today's turbulent environment of fleeting standards and Intel-vs.-AMD skullduggery, CPUs, motherboards, and memory cannot be mixed and matched with abandon. Your CPU is inextricably linked to your motherboard, which is intractably married to your memory. So, when making upgrading decisions, you need to consider all three component categories as a single, cohesive unit.

Now with all the caveats out of the way, here's the lowdown on what's hot in the CPU and mobo spaces.

CPUs: If you've got your heart set on **AMD** silicon, at this point in time you can do no better than the **1.4GHz "Thunderbird" Athlon** ($200, various online vendors). With an effective memory-channel speed of 266MHz, the 1.4GHz Athlon is the epitome of muscle-car power, and it ripples with low-end torque. The Athlon's core architecture is loaded with floating-point units that help the CPU post dominating scores in pretty much every 3D game, save those based on the *Quake III* engine.

On the other side of the fence stands **Intel**'s **1.7GHz Pentium 4** ($350, various online vendors), whose memory bus effectively runs at 400MHz (for more information on both the Athlon's and P4's bus architectures see Tom Halfhill's column on page 11). Like an exotic supercar of the 1970s, the P4 has been fine-tuned to hit an outrageous top-speed. In fact, 1.7GHz just hints at the P4's frequency potential. But while 1.7GHz is certainly an impressive number on paper, the P4's implementation of this outrageous clock frequency doesn't always pay off in real-life performance dividends. Indeed, the P4's core architecture has trouble chewing through many older games and applications that don't fully utilize its special SSE2 optimizations. But when SSE2 optimizations are enabled, brother, stand back.



Mobo The Tyan Thunderbird K7 is a *dual*-Athlon motherboard. You can do no better.

While AMD's 1.4GHz Athlon Thunderbird appears to be the better all-around performer in most applications, the P4 is picking up a lot of ground as it approaches the 2GHz mark. In fact, we were shocked to discover that a 1.7GHz P4 system smoked a 1.4GHz Athlon system in *SYSmark2001*, which tests multitasking in Windows apps. Just keep in mind that AMD is about to introduce a successor to the Thunderbird version of its Athlon chip. The new version is codenamed Palomino, and adds SSE support as well as some other tweaks to ratchet up performance.

Please be aware that Intel will soon release a new motherboard socket for the P4, and may dump Direct RDRAM as its memory of choice. The AMD platform, meanwhile, is more stable. (Socket A mobo connectors and DDR memory will be supported for the foreseeable future.) With its lower prices, cheaper memory, and firm upgrading roadmap, the Athlon is the easy choice for ultimate upgraders.

Motherboards: The **Tyan Thunder K7** ($550-$750, **www.tyan.com**) is the ultimate Athlon motherboard. Sure, it's a workstation-level board that requires a special power supply and "registered" PC2100 DDR memory (both of which you most likely lack), but the board includes AMD's 760MP chipset, which supports dual-proc madness. This means you can buy the board now to set up a single-Athlon rig, and when Windows XP goes gold, you can buy a second proc for SMP-lovin'. The Thunder K7 also gives you dual LAN connections and Ultra160 SCSI.

If you're not willing to shell out $600 for a mobo, consider the **Gigabyte GA-7DX** ($130, **www.giga-byte.com**) and the **Asus A7M266** ($170, **www.asus.com**). The Asus has tested faster than the Gigabyte and features a VIA 686B southbridge that's alleged to be more compatible with some third-party hardware than AMD's own southbridge chip! But for the conservative buyer who wants to stick with AMD parts through and through, the Gigabyte makes more sense (AMD itself uses the board in its reference platform).

TRUSTY BUDGET ALTERNATIVE

Our budget choice for Athlons is the **Iwill KK266-R** ($110, www.iwillusa.com). It lets you use your existing PC100/PC133 memory, gives you IDE RAID, and supports various Athlon and Duron iterations. Considering that DDR memory gives you just a scant 10 percent performance increase over PC133 memory in most apps, boards like the KK266-R may be the way to go (for now).

With Intel's roadmap in complete disarray, we find it difficult to recommend a P4 mobo. But if you're hell-bent on enjoying Intel's famed chipset reliability, take a look at the **Asus P4T** ($180). This performance P4 board is recognized as the one to beat and comes with a plate that lets you mount the board in older, non-P4-ready cases.

If you're thinking low-end and want to run a Socket 370 Pentium III or Celeron, you must buy a mobo that includes support for Intel's upcoming Tualatin CPU (which is essentially a hyper-clocked P-III with more L2 cache). If your board doesn't support Tualatin, you'll be hosed for future upgrades. You basically want a step "B0" chipset of the 815. Most motherboard makers will pimp Tualatin support to market their boards, so if the board doesn't specifically say it works with Tualatin, it probably won't.

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SPEAKERS

You can forget about virtual-reality headsets and other gadgets that promise an immersive experience but never deliver. If you really want a mind-blowing PC experience, buy a great set of PC speakers. With the right surround-sound setup, you can hear enemies creeping up on your flank when playing multiplayer games, or hear 360 degrees of sound effects when you watch DVD movies. But 5W stereo jobbies from Radio Shack just won't do. You must have more power.

No other speaker set can put you inside a virtual gaming world better than the **Klipsch ProMedia 4.1** ($300, www.klipsch.com). All told, the ProMedia 4.1's four dual-driver satellites and single subwoofer offer up 400W of audio power. That's almost twice as much juice as any other set of PC speakers—and those watts are driven very efficiently, resulting in a big, BIG sound.

High wattage output is important, but actual audio quality is what separates good speakers from great speakers, and the Klipschies have quality in spades. During music playback, they have a big, warm sound that crackles with clarity and shimmers in the high frequencies where lesser PC speakers merely hiss. On the bottom end, the bass-reflex subwoofer dives to an astounding 29Hz. You probably won't be able to hear sounds that low, but you'll definitely feel them when you let fly with a flurry of ordinance in first-person shooters.

The ProMedia 4.1s are tops for gaming greatness and all-around punch, but they can't match the **VideoLogic DigiTheatre DTS** ($600, www.videologic.com) for PCs that need to double as DVD home theater rigs. The DigiTheatre DTS system's flat frequency response and super-efficient speakers turn out audio that's as sharp and pristine as, well, DVD video. Both the ProMedias and the DigiTheatres received Perfect 10 verdicts in past issues of *Maximum PC*. ■

Speakers **Power matters when you want wrap-around PC audio. The Klipsch ProMedias deliver.**

TRUSTY BUDGET ALTERNATIVE

Among 2.1 speaker sets (two satellites and a subwoofer), the **Labtec Pulse 424** trails only the **Klipsch 2.1** when it comes to low-end bass bombasity. In fact, the subwoofer's whoomph is so impressive, we still can't believe the set is from Labtec—or that it costs just $50. Considering that the Klipsch 2.1s cost $400, the Labtecs are the steal of the year.

10 UPGRADING COMMANDMENTS

I. Multiply your estimated upgrading time by five. This will account for all the time it takes to exorcise inevitable upgrading demons.

II. Image your hard drive before dismantling your PC. It's the one sure-fire way to protect your intellectual investment.

III. Make sure you properly set your motherboard voltage jumpers. Wrong voltage? Dead processor.

IV. Save your screws! You'll dismantle your PC, install your new parts, and then cry—because you didn't save your screws. Save your screws!

V. Always consider cooling. Adding two hard drives, an optical drive, and a faster CPU to a rig creates a lot of heat—so your upgrading projects better include some extra fans, or you'll be quickly dispatched to lock-up hell.

VI. To protect your parts from malevolent static discharge, follow the righteous grounding sequence: Turn off your PC, remove its case, put your hand on the power supply, and *then* unplug the PC.

VII. Don't skimp on your power supply. A good 300-watter should serve you well as you add more and more parts to your bountiful rig.

VIII. Check Price Watch (pricewatch.com) for the lowest prices available and ResellerRatings.com to verify the legitimacy of individual online vendors.

IX. Save your receipts—for many a false prophet will sell you bunk hardware that doesn't work when you plug it in.

X. Thou shalt not drink sodas in thine work area!

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The R505. Powerful, portable, versatile.
Is it possible to fall in love with an inanimate object?

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SONY

DREAM ON™ >>>>>>

A 1" thin, 3.75-lb., super-fast, micro notebook megastar. Centerfold material, yes. But, smart too. Browse the Internet, sync your PDA on the fly. Store tons of information on your 20 GB[1] hard drive. Even view digital video clips or stills captured through the i.LINK® Interface.[2] The Intel® Pentium® III processor 850 MHz[3] with SpeedStep™ technology,[4] and a high-capacity Lithium-ion battery give you the power to be productive for hours.[5] And, that's all undocked.

Buy now and get a free wireless modem from GoAmerica,* when you sign a 2-year contract with GoAmerica's wireless Internet service.

The optional wafer-thin SlimDock™ docking station adds a whole other dimension. It transforms the R505 into an all-in-one, 3-drive notebook in seconds. So you can do everything above. And then some. Record and play digital videos. Rip and burn music. Anything you need a DVD, CD-RW or floppy drive to retrieve, save or share can be done with the SlimDock station. And you'll look really techno-savvy doing it. Check out an R505 and its optional SlimDock station today. This is true love after all, not some high school crush. Models starting at $2,499. SlimDock station starting at $399.

Visit your local retailer or www.sony.com/vaio today. To buy now, call 888 376-VAIO.

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Sony PCs use genuine Microsoft® Windows®.
www.microsoft.com/piracy/howtotell

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YOUR GUIDE TO

SpecSp

Reading the performance specs on a **hardware box** can feel like reading the menu at a French restaurant. If you don't actually understand the words on the page, you'll have no idea what you're about to sink your teeth into. And so go **hardware specs**. But choosing hardware doesn't have to be that tough. Simply learn the language of specs with our handy guide, and you'll never have to worry about buying something disgusting and distasteful. Sweetbreads, anyone?
Bon appétit...

PHOTOGRAPHY BY ARNOLD TIDSEJO

MONITORS

Tube: SupaFlat™ ZFT

CRT type: INVAR shadow mask

Size: 19 in.

Viewable image size: 18.0 in.

Dot pitch: 0.20mm (horizontal)

Maximum refresh rates:
640x480: 160Hz
800x600: 160Hz
1024x768: 155Hz
1157x870: 140Hz
1280x1024: 120Hz
1600x1200: 100Hz
1600x1280: 95Hz
1856x1392: 87Hz
1920x1440: 85Hz
2048x1536: 75Hz

Tube: Many CRT companies like to pimp the specific, trademarked name of their monitor technology. Because these hyperbolic names often impart little information about the actual product, skip this hoo-ha and zip on down to the "CRT type" entry.

Size: You'll most likely find 15, 17, 19, or 21 inches listed here. But the "size" spec only refers to the size class the monitor belongs to, not the actual viewing area.

Dot pitch: A CRT's pitch refers to the distance between two neighboring phosphor dots of the same color. This spec is always described in fractions of a millimeter and is usually measured diagonally. Smaller numbers are always better, because the closer the dots are to each other, the crisper the picture will be. Shadow-mask monitors boast a dot pitch, while aperture grilles boast a stripe pitch. Be aware that some shadow-mask monitor vendors define pitch as a horizontal dot pitch, yielding a number that's a bit smaller than the traditional diagonal pitch measurement. To wit: A monitor with a 0.28mm dot pitch will boast a 0.24mm dot pitch if measured horizontally. Caveat emptor.

CRT type: Here you'll learn some legitimately important information about the display—specifically, whether it's a shadow-mask or aperture-grille CRT (that's cathode ray tube, the same technology used in traditional television sets). Shadow-mask CRTs tend to be dimmer than aperture-grille CRTs and have more problems with color consistency (a.k.a. "screen mottling"). But shadow-masks do lack the two razor-thin horizontal lines found on all aperture-grille displays (some people find these lines to be distracting). Invar is an iron-nickel alloy that's used in the monitor's mask. The mask is essentially a perforated piece of metal that guides the monitor's electron gun to the precise phosphor dots it needs to illuminate.

Viewable image size: The screen on any CRT features a perimeter that can't display actual colored pixels, so it's only fair that CRT vendors share information on a monitor's actual viewable image area. This area is always expressed as a diagonal measurement.

Maximum refresh rates: As you increase a monitor's resolution, its refresh rate will drop accordingly. For this very reason, maximum refresh rates and resolutions are usually grouped together in the same spec slot. These numbers should always be as high as possible—you never want to see low refresh and resolution specs. Ideally, your monitor will still be able to support high refresh rates (85Hz and above) at its highest resolution settings. Refresh rates below 75Hz can cause a flickering effect that will eventually strain your eyes. As for resolutions, 1600x1200 is considered the lowest "pro-level" resolution acceptable for serious graphic design work.

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VIDEOCARDS

Chipset: It's the driving force behind everything your videocard is capable of. There are three chipsets worth considering right now: the GeForce line from nVidia, the Kyro line from ST Microelectronics, and the Radeon line from ATI. The GeForce and Radeon lines each boast several subdivisions, so you'll find everything from $80 budget cards to $400 ultimate gaming cards under their umbrellas. Nonetheless, each card in each product line is based on the same chipset.

Memory size: All videocards include a certain amount of onboard, high-speed memory. This RAM is used to store information about the geometry of the 3D models the card is rendering, as well as the actual textures that are being stretched across those models. Many current games use the full 32MB that most cards offer and even take advantage of the extra space that a 64MB card offers. A 32MB card will serve you well for the next few months, but a forward-thinking buyer would get a card with 64MB to accommodate future games.

Max resolution: This is the maximum resolution and refresh rate that the videocard will drive, and is a direct function of its RAMDAC speed. Most modern videocards should be capable of running 1600x1200 at 85Hz or faster.

Chipset: GeForce3

Memory size: 64MB

Memory type: 128-bit 230MHz DDR SDRAM

RAMDAC: 350MHz

Max resolution: 2048x1600@85Hz

Memory type: The first portion of our example (128-bit) refers to the amount of data that the card's memory can transfer each clock cycle. Most videocards support 128-bit or 64-bit transfers—the larger the number, the better. The second number is the speed rating of the memory in megahertz. A larger number is better here as well.

Memory can be single data-rate (SDR) or double data-rate (DDR). SDR memory can complete one data transfer per clock cycle. DDR can complete two, making it effectively two times faster than SDR memory of the same frequency.

When you put all of the memory specs together, they essentially tell you the maximum theoretical memory bandwidth of the card. For example, this card is able to transfer two 128-bit chunks of data 230,000,000 times every second, yielding a maximum theoretical memory bandwidth of 7.36GB/sec.

RAMDAC: The RAMDAC (random access memory digital-to-analog converter) converts the digital signal produced by the videocard into an analog signal that a CRT monitor can display. The faster the RAMDAC, the higher the maximum resolution and refresh rate that the videocard can drive.

NOTE: A videocard's spec box won't typically define which specific 3D visual effects the card supports; this information usually appears on a different part of the product packaging. For information on what terms like "anistropic filtering" and "24-bit Z-buffer" mean, check out our guide to 3D terms in the November 99

Because all spec boxes are different—after all, vendors are going to highlight the specs that make their product look best and avoid those that make it look bad—what you'll see here are "spec lists" we created to deliver details on as many specs as possible. You may not see all of our examples on a given box, but you'll definitely see them as you look over multiple boxes.

specspeak

MEMORY

Capacity: This is how much memory is installed on the PCB (printed circuit board—the green board that the memory is stuck onto). RAM slots on most PCs are sparse, so you should try to purchase large-capacity modules whenever possible. In other words, if you want a 64MB upgrade, buy a single 64MB stick instead of two 32MB sticks. This way, you'll still have an open slot for another upgrade in the future.

Formfactor: This refers to the actual physical form of the memory module. Our example has a 168-pin connector and is identified as a DIMM (dual inline memory module). Different mobos are built to house different memory formfactors, so you'll need to refer to your system documentation or peek at the motherboard to determine exactly what kind of RAM you need.

ECC/Parity: Parity memory can detect compromises in data integrity, while ECC (error correction code) memory is not only able to detect errors, but can also correct them. Data-integrity schemes in memory modules are on their way out in most systems, with the exception of critical high-end servers. ECC and parity memory modules are more expensive than traditional memory, and manufacturing processes over the past decade have vastly improved reliability among memory components, so you won't often see error correction offered on memory.

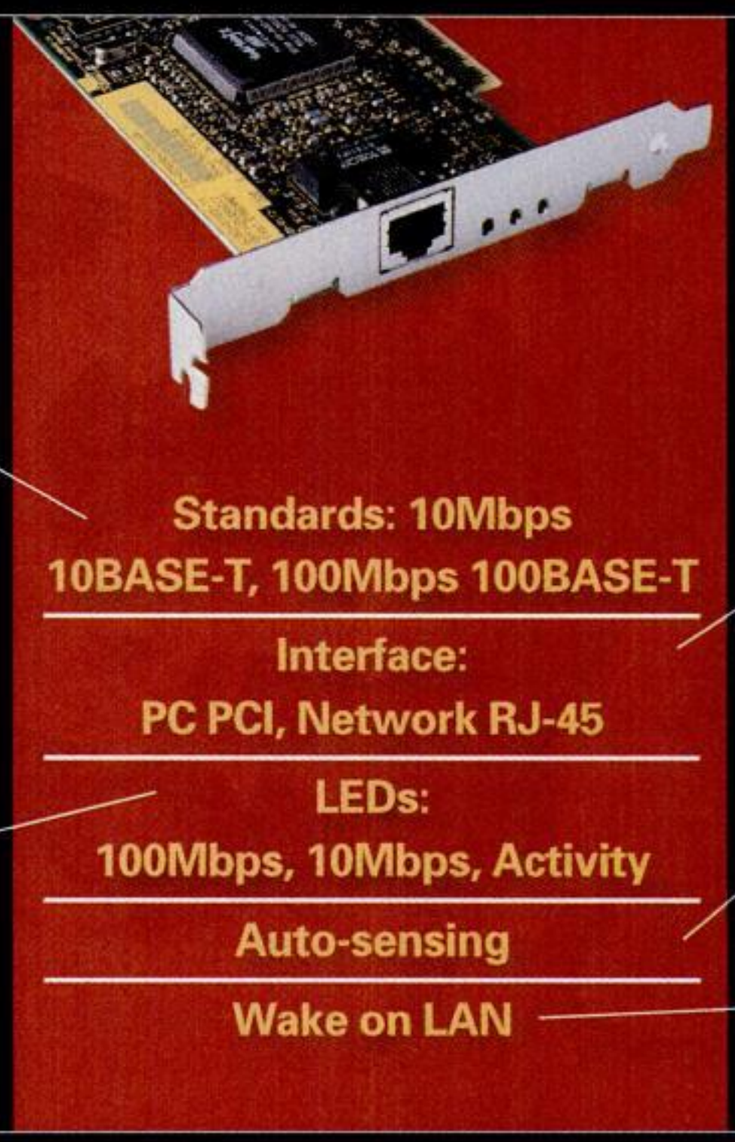
CAS latency: Column address strobe (CAS) is used in conjunction with row address strobe to locate information in RAM. The CAS latency, or CAS rating, refers to the number of clock cycles it takes to perform this locating function. A CL3 factor means it takes three clock cycles to locate information, whereas memory with a CL2 factor takes just two clock cycles. This doesn't mean you get 33 percent faster performance with CL2. In fact, the difference in most systems will be nominal. Still, memory-intensive applications and overclocked processors may get a boost from lower latency ratings. You can mix CL2 and CL3 modules, but they'll all run at CL3.

Memory speed: There are two methods of classifying the speed of your RAM. Traditionally, memory speed has been measured in nanoseconds, with ratings that range from 80ns to 50ns. Lower numbers indicate faster access times. But SDRAM (synchronous dynamic RAM) memory chips synchronize themselves with your PC's system clock. (No, it's not the one that tells you the time; it's the one that sends out a regular signal, like a metronome, to which all of the machine's components can synchronize). As a result, the speed of most new memory modules is expressed in megahertz, just like your CPU. In this case, higher numbers are better.

Type: RAM type usually refers to the clock speed of the chips and the technology they use. Our example is SDRAM running at 133MHz. You can sometimes mix RAM configured at different clock speeds, but all modules will synchronize to the speed of the slowest module. Regardless, you'll need to refer to your system documentation to match up the proper RAM with your motherboard and processor.

Voltage: This is the amount of power your memory requires. Older systems used memory modules that operated at 5v, but these days, most RAM operates at 3.3v. But even this modest voltage is being replaced with the power-sipping 2.5v standard. Don't even think about using chips that can't operate at the voltage your motherboard requires.

NICs NETWORK INTERFACE CARDS



Standards: This lets you know what network protocols your card supports. Our example card supports the classic Ethernet 10BASE-T, which operates at 10 megabits per second, or 1.25MB/sec; 100BASE-T ups the ante to a gratifying 100Mbps, or 12.5MB/sec. Remember, though, that all nodes on your network share this bandwidth, so the actual throughput on any given machine will depend on the amount of network traffic.

LEDs: They're more than just pretty lights. Light-emitting diodes, or LEDs, can help you diagnose problems with your network. This card conveniently offers separate LEDs that indicate when data is being transmitted over a 100BASE-T network or a 10BASE-T network, as well as a handy extra light that illuminates when you're connected to the network and flashes whenever you're transmitting or receiving data.

Interface: This indicates how your NIC connects to your PC and your network. This card is intended for a PC PCI slot and requires cables with RJ-45 (registered jack) connectors. These connectors look like telephone jacks, but are slightly wider and hold up to eight wires each.

Auto-sensing: An auto-sensing card can identify whether you've plugged into a 100BASE-T network or a 10BASE-T network and configure itself accordingly. Without this capability, you'd have to manually switch the network through software or a hardware jumper.

Wake on LAN: Wake on LAN cards support ACPI (advanced configuration and power interface) remote wake up, which is a long-winded way of saying that they're capable of remotely powering up your Windows 98 or Windows 2000 PC.

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OPTICAL DRIVES

Interface: Internal optical drives use either the SCSI or EIDE (also known as ATAPI) interfaces. At the risk of bringing up the age-old SCSI vs. IDE brouhaha, most users will be perfectly happy with the cheaper IDE drives (though SCSI does have the advantage of dedicated controllers that don't place the burden of I/O tasks on your CPU, and the capacity for chaining more than two drives on a single cable).

DAE speed: DAE, or digital audio extraction, indicates how fast an optical drive can extract tracks from an audio CD using the 1x=150KB/sec ratio. Again, higher numbers are better. DAE times tend to be slower than general read times because audio tracks on compact discs aren't recorded in the same way that files are recorded on a hard disk. The laser in your optical drive must not only decode the digital data, but must also use complex algorithms and error-correction bits to play a kind of guessing game about exactly where tracks begin and end.

Max. data transfer rate: This is just another expression of the drive's maximum data-read speed. A 40x drive transfers 150KB/sec multiplied by 40, resulting in a maximum data-transfer rate of 6,000KB/sec.

Data buffer size: Data buffers are crucial to preventing the buffer underruns that cause you to burn coasters instead of usable CDs. Buffers essentially ensure that a constant stream of information is available to your burner's laser. If the data buffer runs dry during the burning process, the laser stops recording, and the disc is ruined. When writing at 16x speed, a data-starved 2MB buffer can survive for just under a second before it drains completely. Buffer-underrun protection technology (such as Burn Proof) can eliminate the consequences of this problem.

Formats supported: Among the glut of formats out there, these are recognized by most optical drives:

- CD-DA ("Red Book") is a garden-variety audio CD.
- CD-Text is an audio CD with extended text information containing artist and track names, credits, etc.
- CD-ROM ("Yellow Book") is a standard data CD.
- Mixed-mode CD-ROM contains audio CD and data CD information.
- CD-ROM XA is a photo-CD format, or a data CD with interactive multimedia content.
- Photo-CD is based on the CDROM-XA format and is used to store photographic images.
- Video CD ("White Book") is for video compressed in the MPEG-1 standard. Video CDs can be played by most stand-alone DVD players.
- CD-I ("Green Book") is a precursor to the CD-ROM XA format.
- CD-Extra ("Blue Book") is another stab at a mixed-mode format, but with a hokier name.

Interface: E-IDE (ATAPI)

16x10x40x

DAE speed: 32x

Access speed: 160ms (reading)

Max data transfer rate: 6,000KB/sec

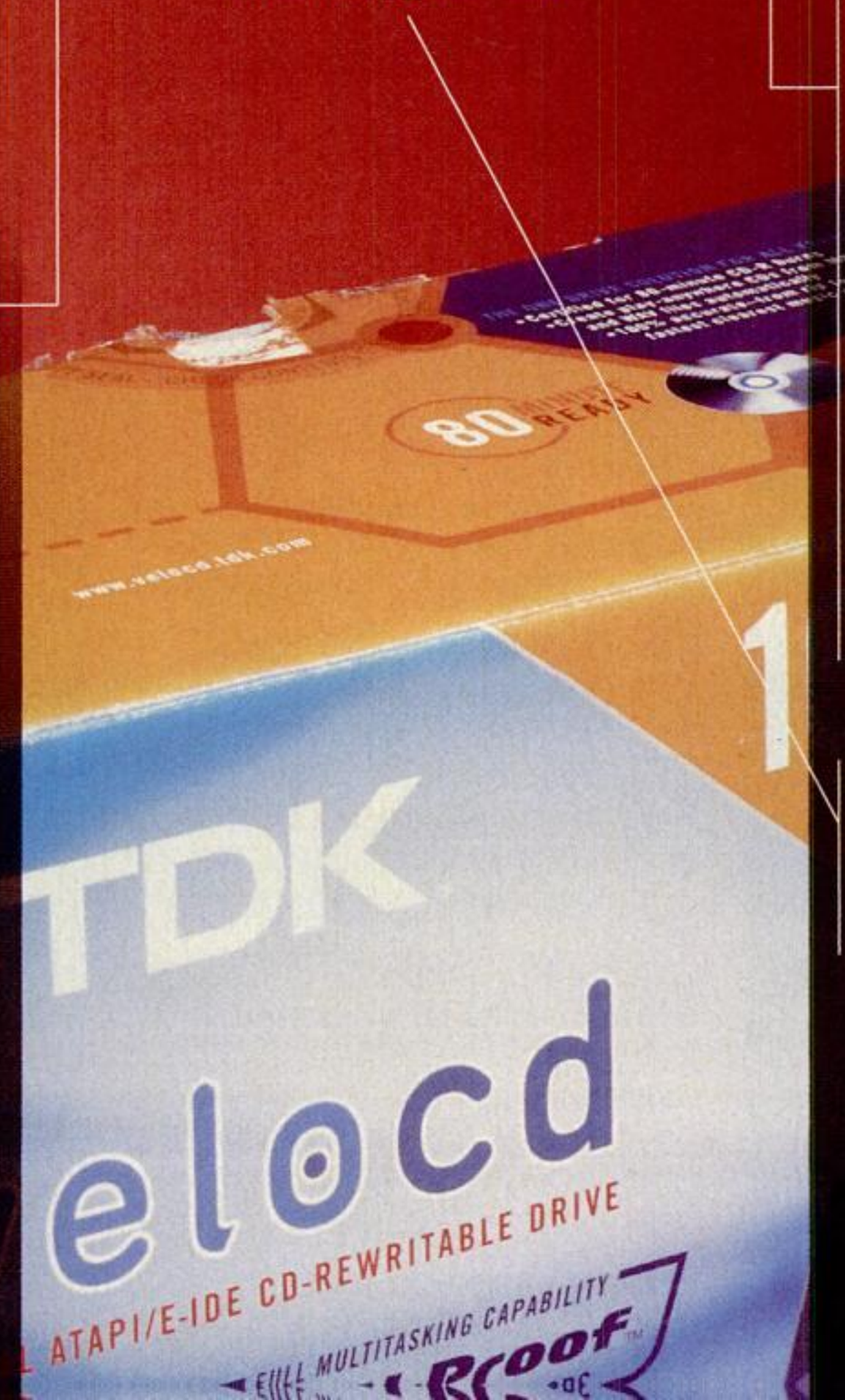
Data buffer size: 2MB

Buffer underrun protection

Recording modes: Disc-at-once, track-at-once (multisession), session-at-once, packet writing

Formats supported: CD-DA, CD-ROM, Photo-CD, Video CD, CD-I, CD-Extra, CD-Text, CD-ROMXA

Flash upgradeable



Write/rewrite/read speed: Optical drives capable of burning to CD-R and CD-RW always indicate speeds in the AxBxCx format, in which A describes the maximum write speed to CD-R, B describes the maximum write speed to CD-RW, and C describes the drive's maximum data read speed. A speed of 1x is 150KB/sec, so data rates higher than this are multiples of this base figure. Needless to say, higher numbers are better across the board. Note that the maximum speed a drive can actually hit before physics begins to upset the process is around 40x. Drives that advertise faster rates, such as Kenwood's True-X drives, use multiple lasers reading simultaneously to achieve higher speeds.

Access speed: This is the amount of time it takes a drive to locate and deliver information. The lower the number, the faster the drive should be. But don't make this the determining factor in selecting a drive. Though most optical drives claim an access time of around 150 milliseconds, there really aren't any specific standards for measuring this type of performance.

Buffer underrun protection: If you're a CD-burning freak, buffer underrun protection is just about the greatest thing since Cocoa Krispies. Branded under such names as Burn Proof, SafeBurn, and JustLink, these technologies can pause recording when the data buffer is empty, then resume recording when it's been refreshed. These pauses, however, can extend burning times and are considered verboten by nitpicky audio-mastering professionals because they leave tiny gaps between data streams.

Recording modes: The options are as follows:

- Disc-at-once: Writes the entire CD in one pass. After writing, your disc is "closed" and you can't add any additional information.
- Track-at-once or multisession: CD can be written to in multiple passes at different times. However, until the disc is "closed," some players—especially consumer devices—may be unable to read the disc.
- Session-at-once: This hybrid mode allows disc-at-once control over gaps left between tracks by track-at-once recording. This method is often used when creating discs in the CD-Extra format, such as audio CDs that include digitized video.
- Packet writing: Formats your disc into small blocks of data, like a floppy disk. Data can be added or erased incrementally. Erased blocks can be reused on a CD-RW, but, on a packet-writing CD-R, erased blocks are masked and become inaccessible.

Flash upgradeable: Trust us, you want this. Flash-upgradeable optical drives have a chip similar to your PC's BIOS that can be "flashed" with new instructions from the manufacturer. These updates can fix bugs, improve performance, and add support for new CD formats.

Teaterial

specspeak

SPEAKERS

Frequency response: The sensitivity of the human ear ranges from 20Hz to 22KHz, and most speaker systems closely approximate that range. Speaker sets without subwoofers, however, may only reach down to 120Hz. Such a set can still pump out bass, but it probably won't rattle windows when you crank up the volume. Speaker sets that do include subs usually come with satellites that boast a frequency response of 150MHz to 250MHz—which is just fine, because the subwoofer takes care of everything below this range.

Crossover points: Take the dust cover off the front of a good stereo speaker and you'll usually see a little speaker (the tweeter) and a big speaker (the woofer). The crossover point is the boundary between the two—the tweeter handles all frequencies above that point, and the woofer handles all frequencies below. In a really good set of PC speakers, the crossover point falls around 200MHz. If individual satellite speakers have two speakers inside, the crossover point usually falls around 5KHz. Dolby Digital speakers have a subwoofer-to-woofer crossover point around 250MHz.

Frequency response: 20Hz-22KHz

Maximum output: 100dB at 20 feet

Crossover points: 5KHz high-frequency crossover

Power output per channel or total power output: 400W total output (25W midrange X 4, 85W subwoofer)

Input connectors: 1/8 inch, S/PDIF, optical

Maximum output: Audio volume is stated in decibels, a figure that's calculated with a complex formula that takes into account the distance between the audio source and where the decibel reading was recorded. That's why manufacturers often include a distance in the maximum output rating, as in "110dB (decibels) at 10 feet." A volume of 60dB is roughly equivalent to the quiet of a golf course. Dance clubs average between 100 and 110dB. For most people, painful sound levels begin at 120dB. At 140dB, run for your life—a jumbo jet is about to land on your head.

Power per channel: Often, a speaker system's power per channel (reported in watts) has more to do with marketing than audio quality. Indeed, an inefficient speaker might use a lot of power to generate average volume levels, while an efficient speaker might use only an average amount of power to generate superior volume levels. Producing bass frequencies always requires more power than producing treble frequencies, which is why subwoofers may draw 65W while satellites may draw only 25W. All of these variables should tell you that the power-per-channel spec is a vague measure of speaker quality at best. As a general rule, though, higher numbers in the power-per-channel spec indicate better-designed speakers.

Input connectors: PC speakers are usually equipped with 1/8-inch "mini" plugs that connect directly into the jacks of your soundcard. Most PC speakers plug into the analog connectors, but some can work with digital connections. These speaker sets have a built-in analog-to-digital converter, and they connect with a mini plug or a S/PDIF digital input that uses an RCA plug. Dolby Digital speakers often come with a box that contains an amplifier, a Dolby Digital decoder, and a digital-to-audio converter, and they often connect to a soundcard with a single optical input. Some PC speakers also have auxiliary inputs, so you can connect more than one PC or other device.

WIRELESS LAN

Standards: If you plan to set up a wireless LAN using hardware from more than one company, be sure it all follows the same standard. Right now, there are three available: WiFi (or 802.11b), HomeRF, and Bluetooth. WiFi-compliant kits are the current industry standard.

Frequency range: This is the area of the radio spectrum in which your wireless kit works. WiFi and Bluetooth operate in the 2.4GHz spectrum, which is also shared by some cordless phones. Microwaves can also cause interference in that region and can affect the range of WiFi kits.

External interfaces: This details the means by which your router or bridge connects to the Internet. Most routers include a standard RJ-45 port that connects to a 10/100baseT LAN. Some also include an internal modem so you can dial into your ISP.

Standards: 802.11b, WiFi

Data transmission rate: 11Mbps/5.5 Mbps/ 2 Mbps/1Mbps

Frequency range: 2400-2483.5MHz

Max distance between terminals: 100 feet indoors, 200 feet outdoors

External interfaces: V.90 56K modem, 10/100baseT

Router or bridge: Router

Data transmission rate: Usually listed in megabits per second, this is the speed at which your wireless connection moves data. As you move farther from the base station, the speed of the connection will drop. Those diminishing speeds are also listed.

Max distance between terminals: This is simply the maximum distance at which the LAN kit will work, usually reported for both indoors and outdoors. FYI: We've found the indoor settings listed to be very optimistic, especially in crowded urban areas.

Router or bridge: Wireless Ethernet access points are available as either bridges or routers. A bridge is like any other section of network cable—it does nothing but pass data from your wired LAN to your wireless LAN. If you use a bridge, you need an IP address for each wireless machine. A router can share a single IP address with more than one wireless machine by using Network Address Translation (NAT).

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SOUNDCARDS

Audio DSP chipset: The digital signal processing (DSP) chip determines the basic features of a soundcard. Every Creative Sound Blaster Live! card uses the EMU10K1 DSP chipset, which caters to digital-music enthusiasts by offering such features as programmable hardware synthesizers. Last year, Crystal Semiconductors introduced a competing DSP called the CS4630, which delivers higher audio resolution and slightly better speed than the EMU10K1, but doesn't perform synthesizer tasks. Several soundcard makers, including Turtle Beach and Hercules, have introduced products based on the CS4630. Other prevalent audio DSP chipsets include the Thunderbird Avenger, made by Philips and used on Philips' Acoustic Edge soundcards, and several Yamaha chipsets found exclusively in Yamaha soundcards.

Hardware voices/hardware audio channels: This is the number of audio streams that a soundcard can play back simultaneously. A single audio stream can be anything from a sound effect to a character vocalization in a game to individual musical notes in a MIDI synthesizer. Most soundcards support 64 hardware voices, which means they can play up to 64 different sounds at one time. Some manufacturers claim simultaneous playback of up to 256 audio streams, but that figure usually combines hardware voices and software voices. Hardware voices run on the soundcard only, while software voices rely on system resources (i.e., your PC's processor and memory). Performance in demanding applications such as 3D games suffers when your soundcard relies on software voices, so be sure your soundcard supports at least 64 hardware voices.

Input/output connectors: PC soundcards output audio at "line level," so you can't connect a soundcard directly to a speaker and get significant volume. Fortunately, most PC speaker sets have a built-in amplifier that brings the audio signal up to "speaker level." If you don't have a set of PC speakers, you can connect the soundcard's outputs to a stereo receiver, which also has a built-in amplifier. In all cases, you'll have to match the soundcard's connectors to your speakers' or stereo receiver's connectors. Most PC soundcards are equipped with 1/8-inch "mini" connectors, to which most PC speaker sets can be directly connected. Some soundcards, such as Creative's Sound Blaster Live! Platinum 5.1 and Hercules' Game Theater XP, come with "breakout boxes" that attach to the soundcard and offer many additional connector options, such as RCA connectors for stereo receivers and optical passthrough connectors for Dolby Digital 5.1 speaker sets.

Audio DSP chipset: EMU10K1

ADC/DAC resolution and sampling rate: 16-bit audio at 48KHz

Hardware voices/hardware audio channels: 64

3D audio formats supported: DirectSound3D, EAX 1.0, A3D

Input/output connectors: 1/8-in., S/PDIF, optical passthrough

ADC/DAC resolution and sampling frequency: Even if you create music on your PC and play it through digital speakers, all audio must at some point be converted to analog in order for you to hear it. All soundcards support signal conversion, both analog-to-digital (ADC) and digital-to-analog (DAC), but not all have the same resolution and sampling frequency, which are measured in bitrate and hertz, respectively. The higher the resolution and sampling frequency offered by your soundcard, the more precise your PC can be in audio reproduction. Accept nothing less than CD quality in these categories: 16-bit resolution, and a 44.1KHz sampling frequency (most consumer-level soundcards support sampling frequency up to 48KHz.)

3D audio formats: When attached to a set of PC speakers that includes at least four speaker boxes, most soundcards can render 3D or "positional" audio, which generates sounds from any direction around a listener. During gaming or DVD-watching, positional audio sounds like you're standing in the middle of all the action. A good soundcard will support DirectSound3D, EAX 1.0, and A3D. DirectSound3D, which is part of Windows' DirectX suite, provides a standardized and relatively simple way for programmers to create 3D positional audio. Creative's EAX extends DirectSound3D with additional audio processing features. Soundcard maker Aureal's A3D technology was designed to circumvent early versions of DirectSound3D, which game developers felt lacked a full set of controls. Because Creative bought Aureal last year, A3D has no future, though many games currently on retail shelves do indeed use A3D for positional audio effects.

SYSTEM REQUIREMENTS

If game companies told you what your system *really* needed in order to get the most our of their games, you probably wouldn't buy the games at all. The "System Requirements" example below was pulled directly from the box of *Sacrifice*.

MINIMUM

CPU: Pentium II 300/ K6-2 550

Memory: 64MB

CD-ROM: 4x

Videocard: 8MB Direct3D card

Hard drive: 650MB free space

RECOMMENDED

CPU: Pentium II 450 / Athlon 450 / Duron 650

Memory: 128MB

CD-ROM: 4x

Videocard: 16MB Direct3D card

Hard drive: 650MB free space

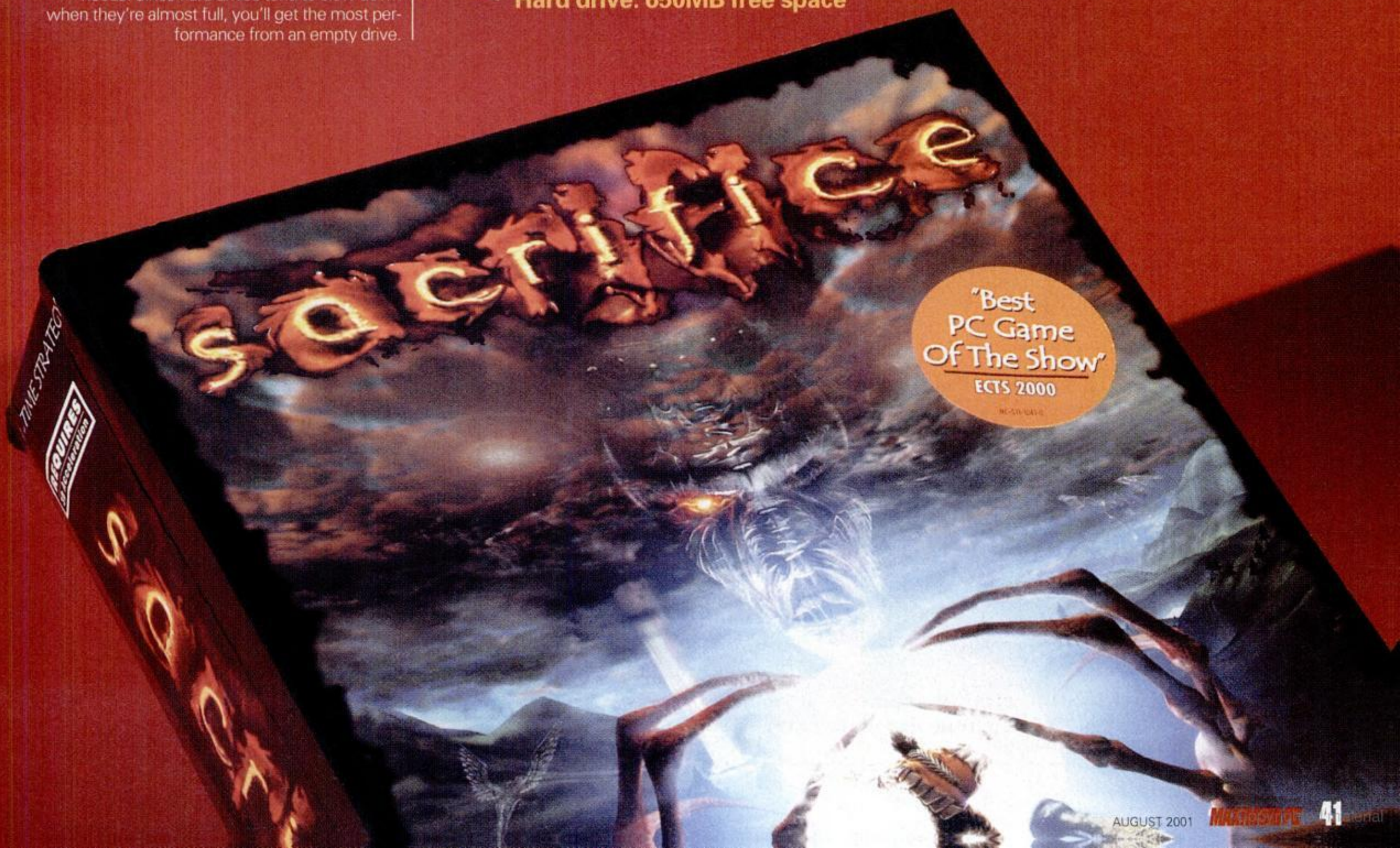
CPU: A 300MHz Pentium II or 550MHz K6-2? Maybe in fantasyland. Intel uses this game as a technology demonstration for its 1.5GHz Pentium 4 machine. We think that even the recommended 450MHz Pentium II is a farce. To get the most from a game, our rule of thumb is to triple the minimum requirement or double the recommended CPU.

CD-ROM: It's often said that few games take advantage of CD-ROM speeds beyond 4x because they use only low-quality video and because most of a game's levels are installed on your hard drive. For the most part, this adage holds up. The reasoning, however, doesn't take into account the long load times of new games. If a game takes two CDs to load, you'll cut your time by a third—possibly by half—by using a CD-ROM that spins at 32x or better.

Hard drive: The box specs rarely lie in this case. If a game requires 650MB to run, you'd better have that much hard-drive space available. But also consider the fact that many games can now be loaded onto the hard drive in their entirety—where they'll lay claim to a helluva lot of space. We recommend you have between three and 10 times more space available than the game says it needs. Since hard drives tend to slow down when they're almost full, you'll get the most performance from an empty drive.

Memory: If you don't mind listening to your hard drive grind while trying to run Windows 98 and this game simultaneously, by all means, 64MB of RAM is enough. But with Windows ME's larger memory footprint, even the recommended 128MB of RAM is insufficient. Again, triple the minimum or double the recommended and you'll find your game sessions won't hit the hard drive as often.

Videocard: As we may have mentioned, game publishers tend to distort reality when describing the minimum videocard needed to render their masterpieces. We'd be surprised if 8MB (Voodoo2-level) or 16MB cards (TNT-level) could run any triple-A game titles. If they did, it would be because you'd turned off so many of the game's details, you might as well load up the text-based *Zork*. Our recommended minimum is a GeForce2 MX 32MB or a Radeon DDR 32MB.



MOD SQUAD

Edited by
Kristen Salvatore

A computer case that's actually a refrigerator? Now we've seen it all. If your idea of case customization stops at a paint job, don't try these tricks at home.

Give or take a few company logos, most computer cases look identical: creamy beige boxes that pique our interest about as much as back-to-back episodes of "Full House." In fact, when you consider how uninspiring most PCs look, it's a wonder that so few self-proclaimed power users have taken the time to modify their cases. But there's a small cadre of PC enthusiasts who've done more than just eliminate the mundane beige case—they've gone the extra mile, taking the art of case modification to its very extremes. With the help of our U.K. sister publication, *PC Answers*, we located four true fanatics—and we do mean fanatics—who've so transformed their computers' cases. Their handiwork is a true monument to ingenuity. Or insanity. You be the judge.

MAD AS A MODDER

A well-worded Internet search will show you relatively quickly that, throughout this wide world of ours, a sizeable number of PC owners are fools for case customization. (Don't bother actually doing this search—we've already done it for you, and on page 50, you'll find a list of sites about just this sort of thing.) A whole lot of PCs out there have benefited from receiving their owners' extra-special attention, with mods ranging from simple paint jobs to sophisticated cooling apparati.

As far as *Maximum PC* is concerned, any mod made to a boring old box is a change for the better. But originality, individuality, and rank obsession must be rewarded, which is why we've determined three classes of case mods. A Class C case is better than your average boo-boo beige, but doesn't encompass much more than a paint job, or perhaps some decals. A Class B case shows a strong commitment to modification—at the very least, there's been some cutting or drilling involved. A Class A case modification is perhaps best described as "totally out of control." If you're making Class A modifications, you're sculpting the plans in the mashed potatoes on your dinner plate. The final result bears virtually no resemblance to a regular computer case. Your friends and family are about to do an intervention because they think you are a complete nutter.

On the next five pages, you'll see examples of five Class A cases and the men who built them.

If you've got a Class A case, we want to know about it. Write us at input@maximumpc.com with a description and a photo. If your case is wacked out enough, we'll consider making it our Rig of the Month. Of course, your twisted genius will then be on display for all the world to see, but the guys profiled on the following pages didn't seem to mind...

Ice Box, 44

Hot Rod, 45

PC Chair, 48

File Server, 49

Neon Case, 50

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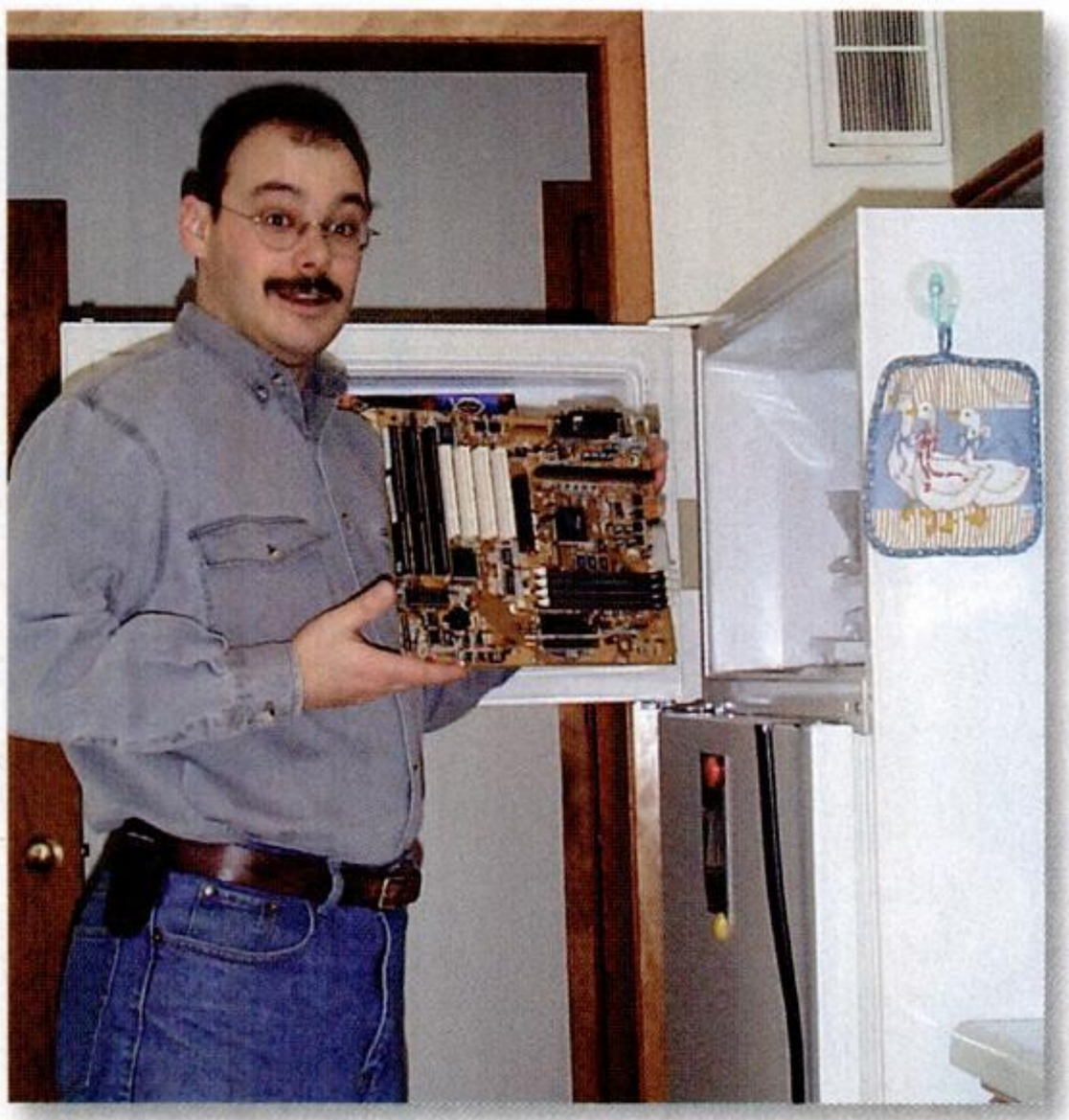
1 Mr. Freeze

Jeff Brown's Project Kool takes overclocking options to a new level

Like the rest of us, Jeff Brown of Manitoba, Canada (insert Canadian joke here), was struggling with the right way to do some heavy-duty overclocking without sizzling his machine's insides. Thus was born "Project Kool."

Yes, Virginia—Jeff built his PC in a refrigerator.

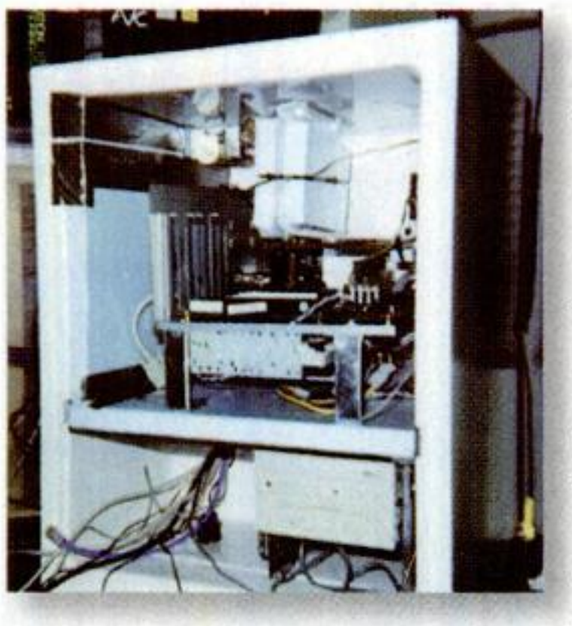


Project Kool **Clear out the frozen peas—we need space for the mobo!**

CHILLED OUT

Why didn't Jim just solder on a big ol' heatsink like, say, the rest of us might have done? He decided that traditional methods of cooling had failed him on two fronts. First, there was the noise. "I had so many fans on my system I could hardly hear the 'lovely' Windows startup sound," Jim says. Second, fans don't take full advantage of an integrated circuit's operating characteristics. For example, higher operating frequencies are possible when chips are cooled below zero degrees Celsius. Jim figured that by lowering the temperature of his system, he could take his overclocking options to a new level.

"The solution was to take a compact refrigerator and use it as a computer case," he explains. "My first job was to get a compact fridge that would be suitable. I needed full access to the evaporator and enough width to fit the motherboard. Depth was not a concern, as I had no plans to use the door. I chose a Danby DCR080WEY-7 because other designs did not allow such easy access to the evaporator. Also, with about 1.7 cubic feet of internal space, I had enough room to install all required parts."



Brrrrr... **Who needs a heat pipe when you've got a Frigidaire?**

As you might imagine, Jeff had to make quite a few alterations to both fridge and PC before he got his system to work. "I had to separate the fridge into two sections. The top section was for the motherboard, cards, hard drive, and power supply. The bottom section, which isn't cooled, houses the CD-ROM and floppy drive. I placed the processor as close to the evaporator as possible, which kept the copper heatsink connection to the evaporator as short as possible. The top part of the fridge was then sealed, and extra insulation was added to reduce losses through the case."

ON THIN ICE

Obviously, such radical adjustments come with a few risks. Jeff solved potential condensation problems by using a desiccant—grade H silica gel—to dry the air. But, he admits, "expansion and contraction due to thermal changes means very few of the devices are attached tightly." And apparently, Windows NT gave Jeff's cool case a chilly reception. "It seems to like things warmed up a bit before starting," he explains, "and on occasion it just shuts down and re-boots, even after running for some time."

THE BIG CHILL

The lowest temperature at which Jeff managed to measure his P-II's heatsink was about minus 27 degrees Celsius. When overclocked to 374MHz—the maximum the board and CPU settings would permit—the CPU temperature rose to about 10 degrees Celsius. But "the real advantage," Jeff remarks, "was the cooling of the videocard and other parts. It made for a much more stable system."

So, was it worth it? Absolutely, Jeff says. "There's nothing to stop you except the possible loss of computer parts and people finding out how odd you really are. Of course, the worst possible consequence is the loss of your beer fridge." We couldn't agree more, Jeff. We couldn't agree more.

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2 Voodoo Ventilation

John Williams' extraordinary attempt to grab a few extra frame rates

[Note: We are not talking about the famous composer of the Star Wars *score.]*

Think you're a *Quake* fanatic? Think again. John Williams of North Carolina found a way to fit a genuine truck exhaust-pipe into his PC in order to cool things down enough to squeeze extra frames per second from his favorite game. And as a finishing touch, he painted his rig Candy Apple Red, a color that was popular in the late 1960s with custom hot-rod shops.

CHROME SWEET CHROME

Our first question to Jim was obvious. Was it perhaps possible that radically modifying his PC with equipment meant for a two-ton moving vehicle was a tad extreme? We couldn't help but be warmed by his reply: "Oh yeah, baby!"

John's passion for PCs—and for *Quake* in particular—is so overwhelming, it's impossible not to get caught up in it all. At an age when many consider hanging up their videocard in exchange for an *Excel* spreadsheet, 43-year-old John spends every spare moment happily blowing off people's heads with an assortment of weaponry in *Quake II* death matches.

GIVE ME SPEED!

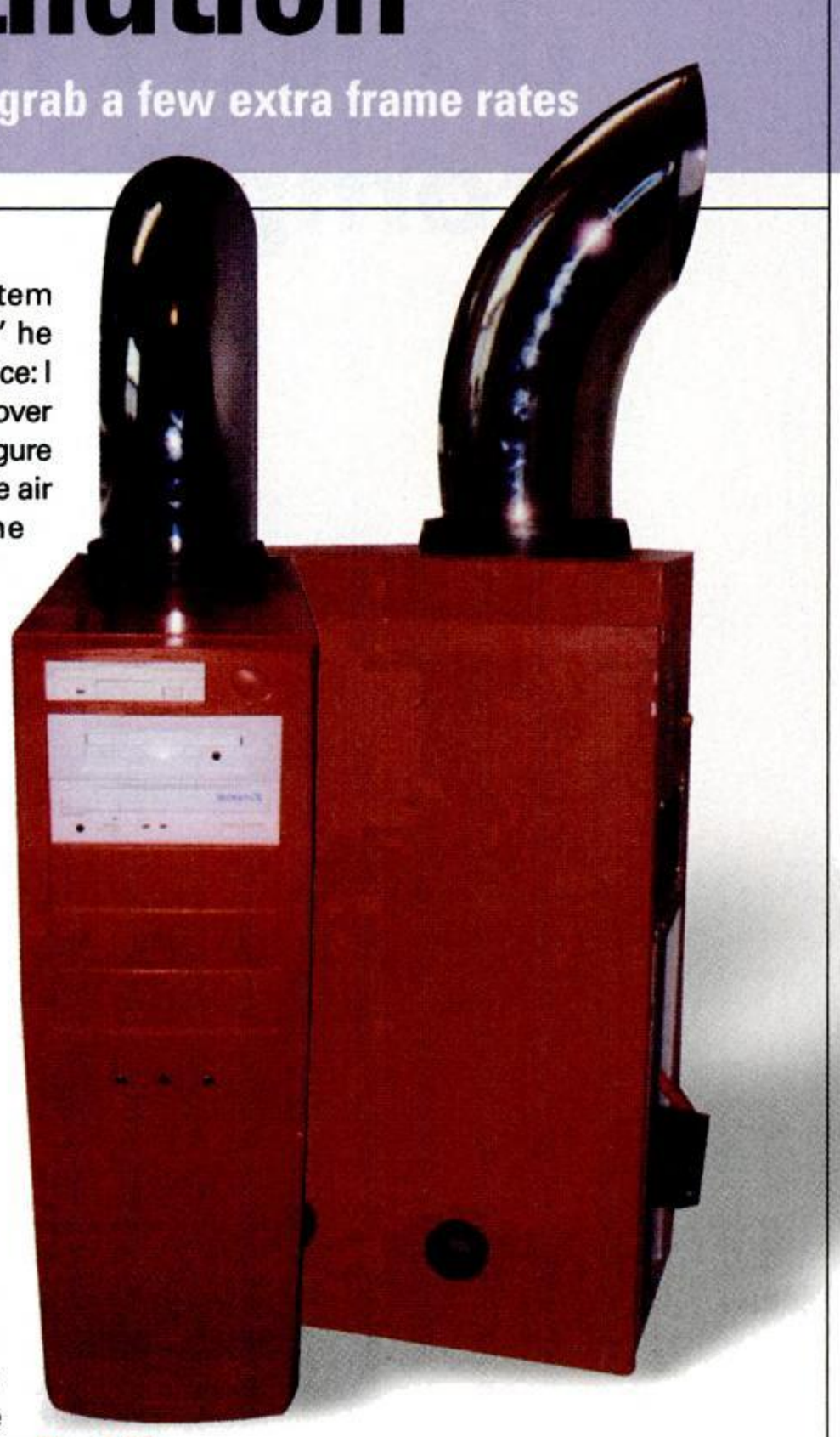
To get maximum *Quake* performance from his P-III, John decided to connect two Voodoo 2 cards together in SLI mode. They delivered faster graphics, but the amount of heat they generated frequently crashed his system.

A man and his machine at "work"...

"I was getting system lockups all the time," he explains. "I had a choice: I could either leave the cover off the case, or I could figure out a way to ram more air into the system. The exhaust-stack idea came because I saw the exhaust coming out of the stacks of tractor-trailers and I realized that's what I needed to do for my computer."

START YOUR ENGINES

Was John worried he'd damage his top-of-the-range P-III system? "Not really," he shrugs dismissively. "If anything was trashed it would only be the case." Was it hard to fit the pipe onto the case? "The only tricky part was cutting the hole in the top of the case and fitting the fan," John says. "I'm ramming 70 cubic feet of air per minute through this case. It keeps my inside temperature at about 90 degrees Fahrenheit."



Diesel PC **Damn! We wish our *cars* were this souped-up!**

And what's the fan like in practice? "The fan itself is really quiet, but there is quite a bit of 'whoosh' created by the air being forced up and out of the exhaust. You couple that with the whining of the 10,000rpm HDD and it sounds like a jet engine starting up!"

DIESEL POWER

John hasn't yet thought of a name for his invention but "there's a track on a Prodigy CD titled 'Diesel' that gave me an idea. At the end of the rap the dude says, 'Model 70680734.1 Robot Sonic.' I snipped that bit of the track and stuffed it into my startup file so that it plays instead of having The Man's Windows chimes ringing in my ears. So I guess you could say that's the name."

And what do people think of his Diesel PC? "Everyone who has seen it thinks it's totally wacked and very cool!" John says. "Woo-hoo!"

Woo-hoo, indeed.

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Upgrading your memory doesn't have to be complicated.

Memory MADNESS
by Oliver Pryct
Across
4. Twice as fast as standard SDRAM
6. Time it takes before data flows
9. Makes your computer faster
13. Stores data on a computer
15. Abbreviated MB
16. Module with 72 pins
19. EEPROM on certain modules
20. Delays memory for one clock cycle
21. Operates at 133MHz
22. Detects and corrects errors
23. A speed of DDR
Down
1. Detec
2. Module
3. Number of edg
4. Module with 168 pi
5. No error-checking capab
7. Typically used in laptops
8. Delivers synchronous bursts of d
10. Asynchronous DRAM, faster than FP
11. Chip set deals directly with memory
12. The "D" in DRAM
14. Abbreviated Mb
17. RAM mounted on a PCB
18. Time it takes to put info into memory
21. Operates at 100MHz
A-5 March 15, 2001
GET MORE MEMORY? HOW?

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3

In the Hot Seat

Daniel Baker's cushioned creation is a serious space-saver

It's either a fantastic achievement or a waste of perfectly good PC parts, but there's no denying this: Daniel Baker's PC chair is a true original (in both the PC and furniture worlds, we suspect). Taking space-saving to a new level, Daniel found a way to house his computer inside his computer chair. If that's not handy, we don't know what is.

All right, *we* might not do it. But who cares? The guy built a computer inside his chair, for crying out loud!

MESSAGE IN A BOTTLE

Just how did Daniel dream up this genius idea? "I drew up the original plans when I was slightly drunk," he explains, "which is fortunately not reflected in the final outcome. It was based on an old armless chair I had sitting around and lots of old computer parts. (Daniel's from the U.K., where, we're told, lots of brainstorming is done while tipping back a few.)

Here's how The Chair was constructed. First, Daniel boxed in the legs of the chair with some wooden slats. The floppy-disk drive and CD-ROM drive fit neatly into the side panel of the chair; the on/off switch is on the front. The motherboard is screwed to the underside of the seat, as are the hard disks. The cables plug into the mobo through the side opposite the drives, and the cards sit in the motherboard just as they would be in any other machine. Sort of.

DRILLER KILLER

Obviously, a PC design as radical as this one didn't come without its problems. "In order to secure the expansion cards in place," Daniel explains, "I had to remove the back panel from an old ATX case. It was a fairly nasty process, mainly because it involved a large hammer, a hacksaw, and ultimately just jumping up and down on it until it broke off."

And even after all of The Chair's components were in place, Daniel still ran into trouble. The biggest problem? Neither RAM nor CPUs are ideally suited to work while hanging upside down. To keep all of his PC's parts in place, Daniel was forced to adopt some slightly radical ideas. He kept the RAM in place by filing down the connectors in order to make a better fit, but the delicate CPU was eventually cemented into its spot with a dollop of glue.

"The whole thing took me about a week to build and about a month to get running," Daniel says, "mainly because I accidentally drilled into my hard drive. While drilling a hole in the side of the chair, I suddenly got the feeling that what I was drilling into wasn't wood!"

The Chair **Bringing new meaning to the phrase "added functionality," Daniel Baker's crazy contraption is equipped with all the regular PC parts. They're just not in their regular places.**

WHY, DAMNIT? WHY?!

Daniel's already admitted that his chair idea had its origins in a few too many swigs of ale, but what actually kept him motivated to finish it? "I guess I was just bored with the bog-standard PC case."

By golly, that's good enough for us.

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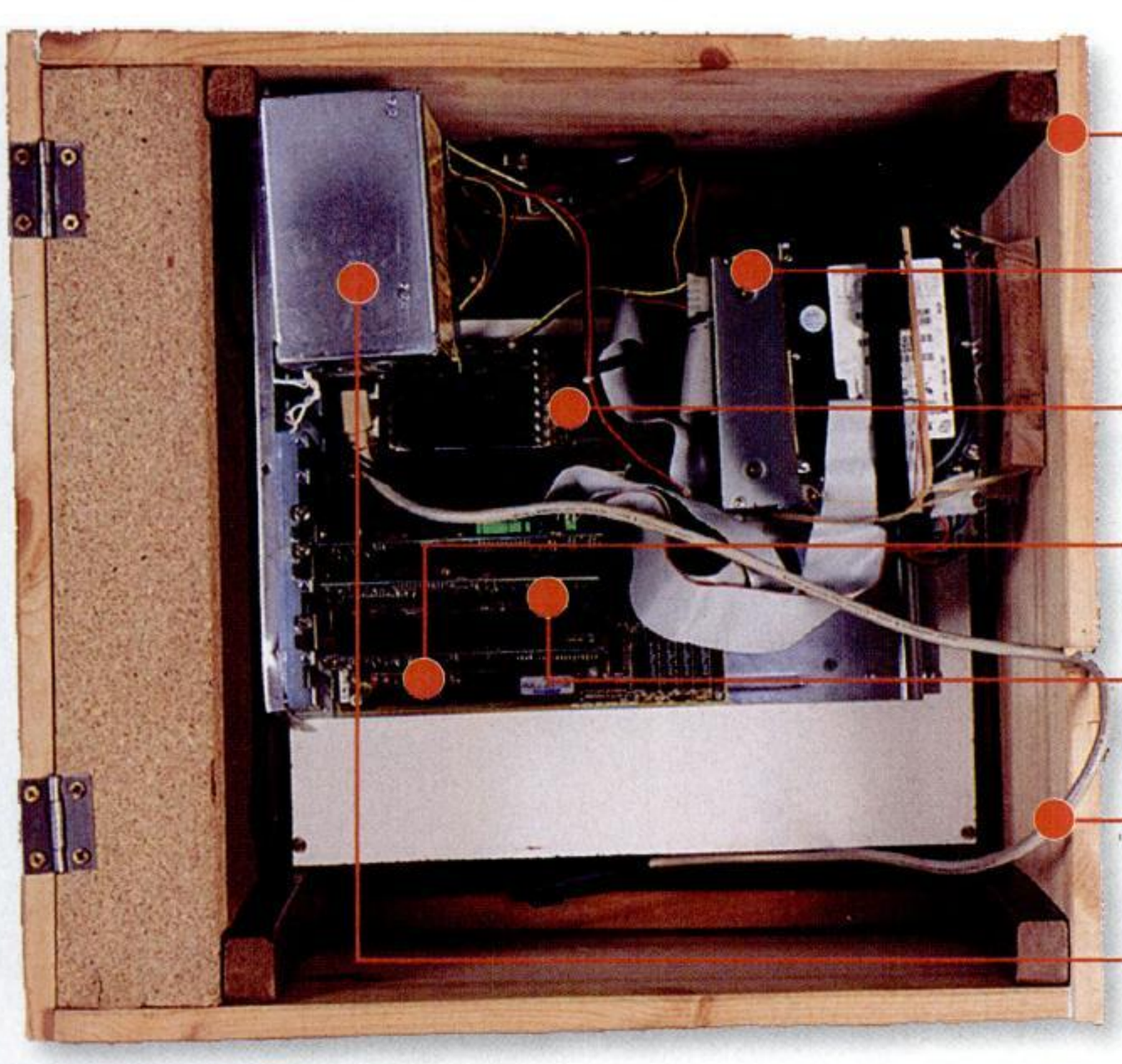
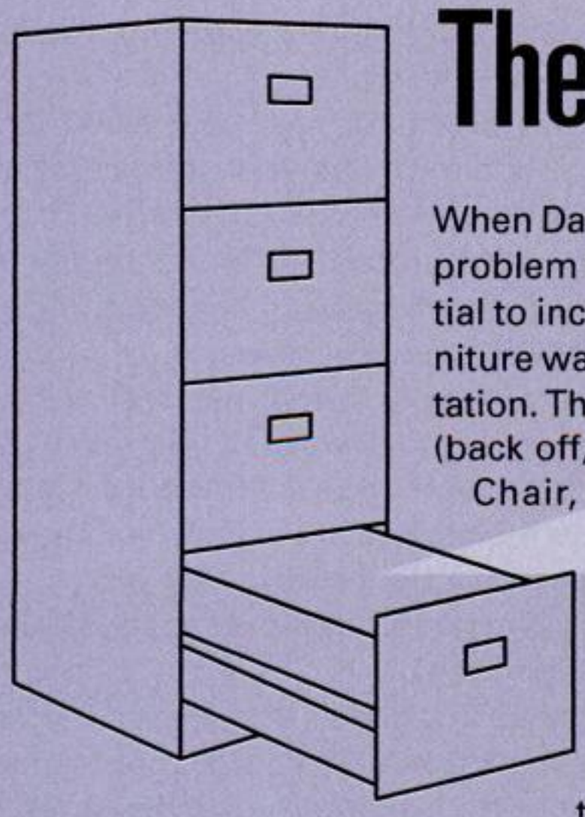




The Definitive File Server

When Daniel was faced with a housing problem for his new server, the potential to incorporate it into a piece of furniture was simply too much of a temptation. Thus was born... The File Server (back off, *we* didn't name it). Like The Chair, The File Server came from more than just a warped compulsion to install PCs into every piece of furniture in the house. "My home is a bit short of space," Daniel explains. "I was thinking of where to put the new PC, and it was suggested that it could go in a small tower-case and sit on *top* of the filing cabinet. But why put a PC on top of a filing cabinet when you can put it *in* one?

"To my joy, I found that the motherboard fit almost perfectly into an empty drawer, with enough room beside it for the hard drive and the power supply, and for a little cardboard to insulate the electronics against the metal."

Of course not everything went smoothly, and although the server was soon up and running inside its new metal home, drilling the hole in the back of the filing cabinet to accommodate the necessary wires was a little tougher than anticipated. "The thing was like a safe. It took me about 10 minutes to drill through [it], with the drill bit glowing red hot.

"It still seems a little odd to hear the hiss of the fans when I pass by the filing cabinet," admits Daniel (there are three installed), but apart from this obvious clue, there's little to give away The File Server's purpose. After all, what's so unusual about just another noisy filing cabinet?

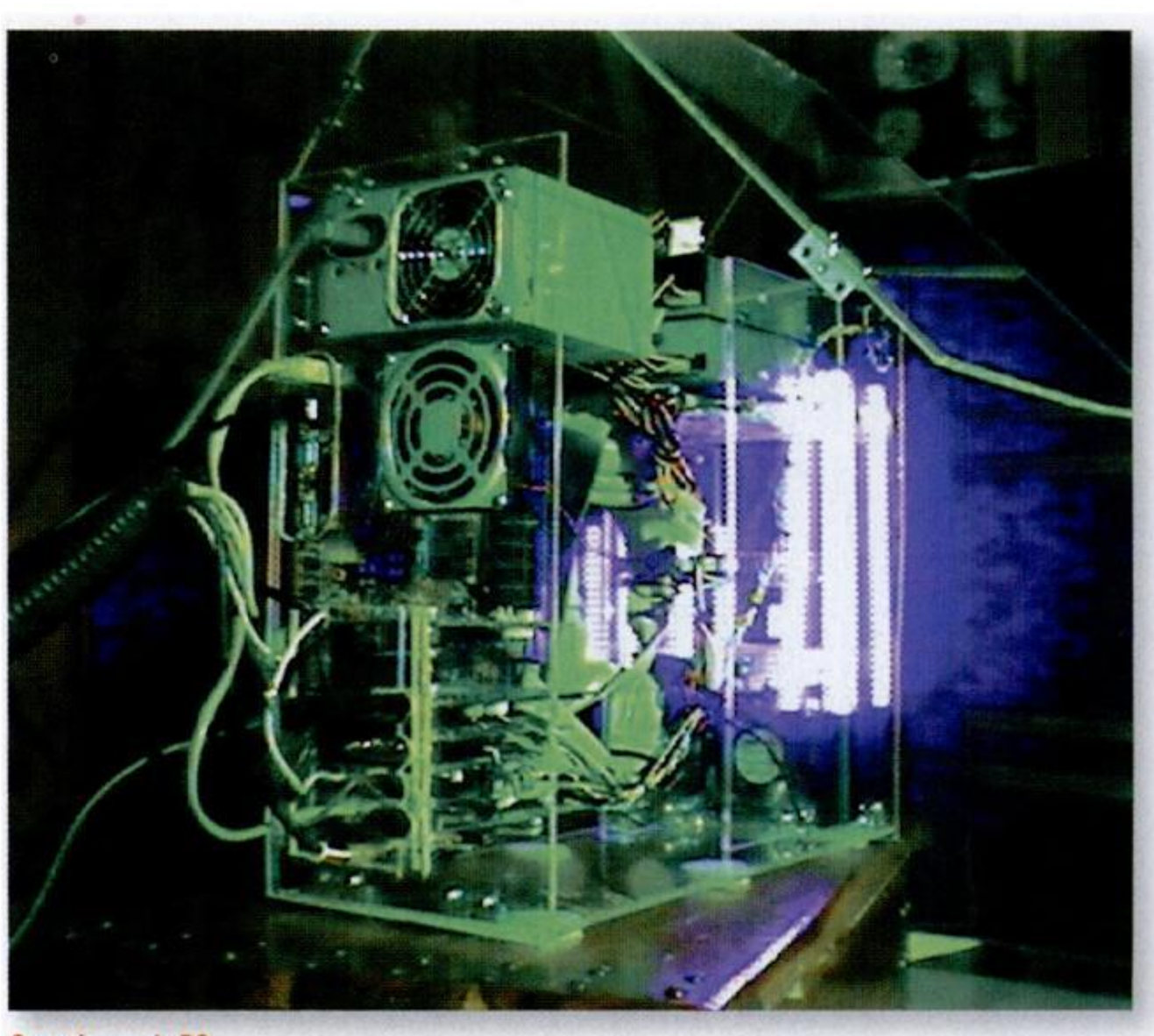
4 Alone in the Dark

Ryan Forsberg's see-through rig nods in the iMac's general direction

What was our initial reaction to Ryan Forsberg's see-through PC case, complete with neon accents? Something along the lines of "Whoa!" pretty much sums it up. We ordinarily see these sorts of accents on the modified automobiles of teenagers who've got too much money at their disposal. But there's no denying the allure of the fact that you can see exactly what's going on at all times in Ryan's rig, or the eerie glow that its neon accents cast in a darkened room.

"I wanted somehow to accentuate the inside of the case, to basically draw attention to the fact it was a clear case," Ryan explains. "I had a neon purple light just laying around the house, so I decided to incorporate it into my design. It was just a matter of hooking up an adapter to plug it into the power supply."

And what sort of reaction has Ryan received from folks who've seen his creation? "Like you guys: shock. Definitely shock!" he laughs.



See-through PC **You cannot help but be hypnotized by its unearthly glow.**

DON'T WAIT UP

Ryan's efforts were spurred on in part by what he saw as a lack of innovation in the PC industry. "As much as I hate to admit it, when Apple released its iMac, it truly revolutionized the computer industry," he says. "Ever since I saw that case on display, I've waited and waited for some PC vendor to release something even remotely as cool. I was very disappointed by how slowly the PC industry has reacted, so I decided to take matters into my own hands."

Naturally, there isn't much of a performance gain to be had from Ryan's custom case. And Ryan said there's no hidden agenda behind the case—its main purpose is to look cool. "It's just bragging rights, because I have yet to see a cooler-looking computer case."

How hard was it to fashion his creation? "I'm actually not a very skilled craftsman, so if I can do it, other people should be able to as well," Ryan says modestly. "I must warn you though: It can be quite a time-consuming project. But if you've got the time, tools, and enough Plexiglas on hand, go for it!"

Our own Gordon Mah Ung was so inspired by Ryan's handiwork, we think it's only a matter of time before his dream of marrying a PC case with a Habitrail becomes a reality. Gordo, we're behind you all the way. Just keep the HabiPC out of the sight lines of strangers. ■

The Truth is out There

Our guide to the best the web has to offer in the way of PC mods

PC Mods

www.pcmods.com

Get your neon light kits here! This is where you'll find the tools you can use to mix it up a little in your very own computer room. PC Mods offers individual parts and full-on kits, so you don't have to go to the trouble of cutting your own case (and possibly making a mess of things, eh?).

PC Workshop

www.pc-workshop.net

Lordy, lordy! Would you look at that! Pretty, pretty pictures of the wild and craaaaazy things people have done to their machines, and how-tos on how you, too, can make some changes for the better. You'll also find directions for submitting the details on your own unbelievable projects. Which you'd better do, because they won't just take your word for it... Not to be missed: the Legendary Modifications section.

Virtual Hideout

www.virtualhideout.net

Home of the Internet's largest case-mod gallery—it consists of photos of over 1,600 modified cases—VirtualHideout is updated every other day. You'll find a massive collective of modding how-tos, reviews, and articles, and a forum where you can share and care with other mod enthusiasts.

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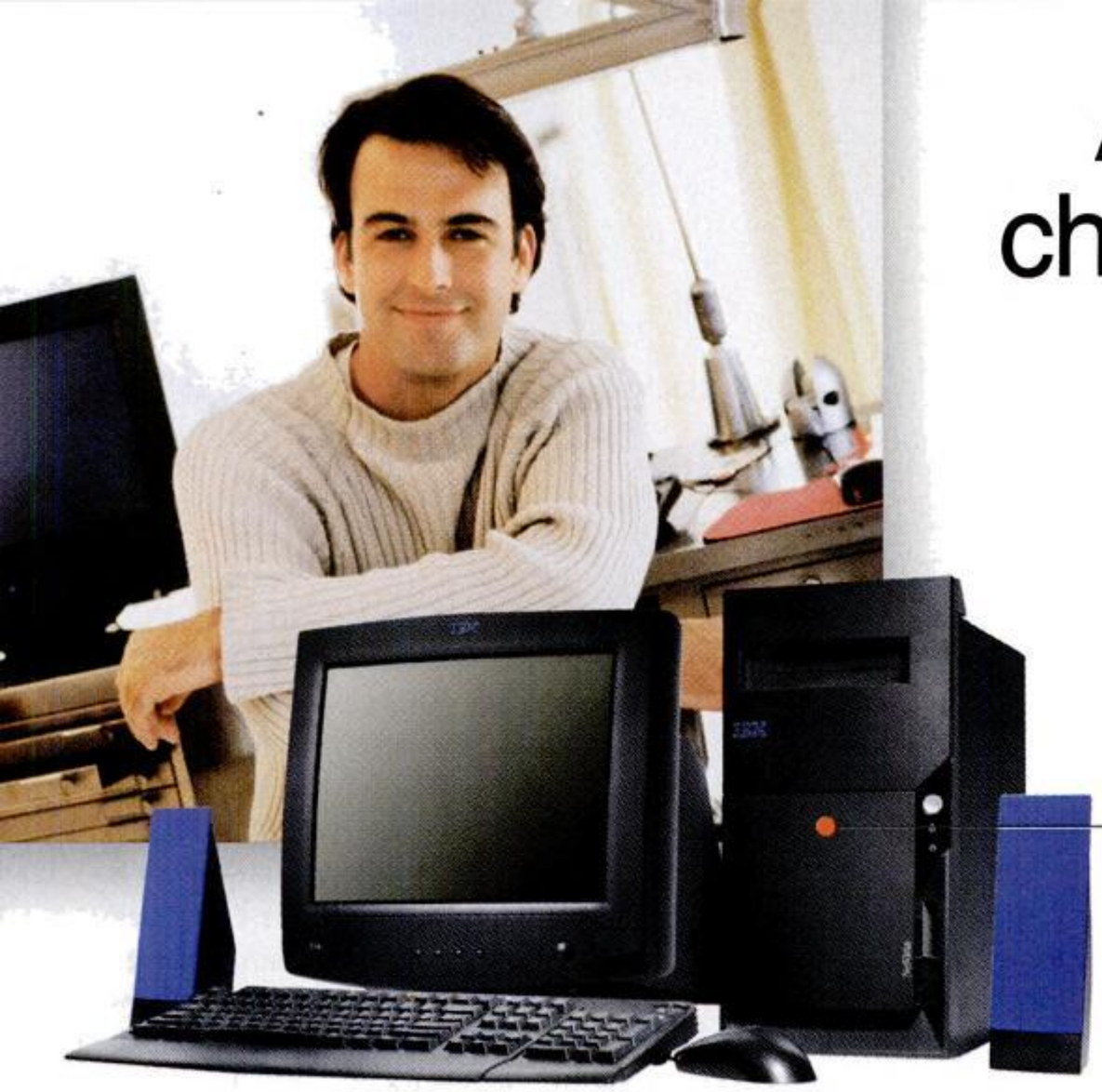

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Ask the Doctor

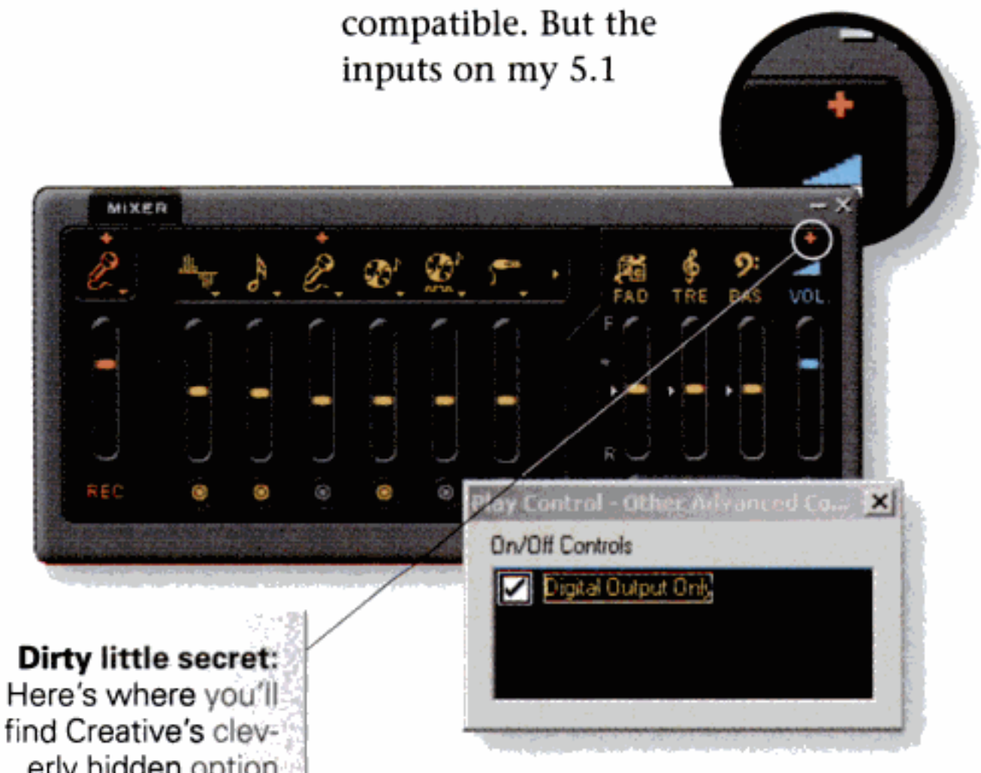
Symptom → Diagnosis → Cure

Even the burliest of PCs comes down with a bug every now and then. That's when you need to call The Doctor and get a diagnosis that'll have you up and running in no time. Send your symptoms to: **doctor@maximumpc.com**. Unfortunately, The Doctor cannot personally respond to every individual letter.

Audio Conjunction Junction

I'm trying to use the digital output of my Sound Blaster Live! Platinum 5.1 (which is the mini-headphone jack) to transfer the Dolby Digital sound to my Surround Sound receiver, which is 5.1 compatible. But the inputs on my 5.1 receiver consist of six plugs: left, right, center, subwoofer, etc. I tried running a single cable that connected a mini-headphone jack to an RCA plug, but I didn't receive any sound output. Do I need a digital-to-analog converter? Or am I just out of luck?

—Erik Butler



Dirty little secret: Here's where you'll find Creative's cleverly hidden option for enabling digital audio output.

You're not out of luck, but the solution depends on whether or not you've got a digital S/PDIF input on your home theater speakers. If you connected your speakers via the S/PDIF input with a mini-headphone-to-RCA-jacks cable, then the problem is an incredibly obscure option in the Sound Blaster Mixer applet. Click the Sound Blaster icon in your System Tray and select Mixer. Note that above the volume control on the far right is a small red "+". Click that, and you'll get a small dialog box that says "Play Control—Other Advanced Options." Check "Digital Output Only." This option actually enables digital output through the S/PDIF jack.

If you don't have a digital input, then you'll need three mini-headphone-to-dual-RCA-jack cables. Run one cable from the green connector on the Sound Blaster to the RCA jacks on your receiver labeled "front left/right." Run another cable from the black Sound Blaster connector to the RCA jacks on your receiver labeled "rear left/right." You can use the Sound Blaster positioning utility to confirm whether or not the RCA jacks need to be reversed. Before connecting the last cable, make sure to turn the volume down—way down. If you mix up the center channel and subwoofer at a high volume, you'll blow your speakers. Connect the last cable to the digital-out on your Sound Blaster to the center and subwoofer inputs on your receiver. Slowly turn up the volume as you play a test signal to see if you're getting the correct signal going to the center channel and subwoofer. Otherwise, just swap the RCA jacks and pop in your *Crouching Tiger, Hidden Dragon* DVD. Vive le différence!

System Resources Exposed

I started with 128MB SDRAM in my PC. Right after booting my computer, with no windows open, I checked my System Properties, and the Performance tab showed that 94 percent of the memory was free. I then added an extra 32MB SDRAM for a total of 160MB SDRAM. Now, after I boot my computer, it still shows that 94 percent of the memory is free. Can you explain to me why 6 percent of memory is still being used *after* I've added memory?

—Richard Harris

The Doctor sure can. The System Resources reported in the Performance tab refers to a tiny 128K area of memory that Windows ropes off for housekeeping, not to the amount of RAM you have available in your system. Because Intel processors can access 64K segments of memory much faster than wider areas, this 128K area is actually split into two 64K segments called "heaps." The two files that access these heaps are USER.EXE, which handles traffic from input devices and ports, and GDI.EXE, which keeps track of open windows and display elements such as fonts and bitmaps. Every application and window that you open consumes a portion of these resources (some programs, such as Internet applications and print managers, tend to consume larger amounts). Try selecting a directory that contains 30 or more folders, select them all, right-click and open them all. Then check your System Resources again. Whether you've got 128MB or 2GB of RAM, your resources will be almost gone, if you haven't already crashed or received a misleading "Out of Memory" message.

If you're really anal and want to know exactly what level your resources are at, select Run from the Start Menu and type "rsrcmtr.exe." This puts an icon in your system tray that meters the status of system resources. If you double-click the icon, you'll get a display that indicates the resource utilization of both heaps. The overall figure of System Resources is determined by the lower of the two numbers. There's no need for panic if your System Resources drop down to around twenty percent, but after that, it's a good idea to start shutting down programs. If you want to monitor your actual RAM utilization, select Run from the Start Menu and type "sysmon.exe."

CPU Fever

I read each issue cover to cover but I don't recall ever seeing in *Maximum PC* what temperature a CPU should be running at. Boy, do I need a life! I have an AMD Thunderbird 800 in an ASUS motherboard. A probe shows it is running at 140 degrees. What temperature is dangerous and what is considered okay?

— James Zimmerman

"System Resources refers to 128K of memory that Windows uses for housekeeping, not to the amount of RAM you have."

***You* need a life? Try telling someone at a party that you tinker with PCs and peripherals for a living and watch them swiftly gravitate to the other side of the room. But**

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A temperature probe attached to your CPU and motherboard could prevent a personal China Syndrome.

enough about The Doctor.

The Doctor consulted with AMD, who said that the "maximum die temperature" of your AMD Thunderbird 800 is 70 degrees Celsius, or 158 degrees Fahrenheit. In English, this means that your CPU has been tested to perform reliably up to that temperature. But there's no need to frantically check probe temperatures—your processor and heatsink were designed to not exceed those levels under normal operating conditions. If you've overclocked your processor or are working in the back of a van parked in the Mojave, well, those aren't normal operating conditions.

If you bought your CPU from a reseller that didn't have a heatsink and/or fan already attached, you can go to www1.amd.com/products/athlon/thermals for a list of "thermal solutions" recommended by AMD for their entire line of CPUs.

It's difficult to give guidelines about optimal temperatures for processors in general, given the wide range of variables, such as the type of heatsink, socket, motherboard, power-management scheme, and even the kind of applications you are running. For temperature specifications on other processors and configurations, your best bet is to check the documentation that came with your system and motherboard. You'll find a comprehensive guide on AMD thermal specs at www.amd.com/products/cpg/athlon/techdocs/pdf/23794.pdf, but be prepared for lines like "Interface material thermal resistance based on core area." Intel offers much better processor documentation on the web at http://support.intel.com/support/processors.

Finally, if your motherboard doesn't have an onboard thermal monitor (which can adjust the speed of your CPU fan relative to the temperature), some of the older models provide a thermal cable that connects a temperature probe on your CPU to a header on the motherboard and sounds an alarm when the temperature becomes excessive.

USB Port Voodoo

I have heard people recommend using the USB port closest to the motherboard for various devices, but I never really paid any attention to it until tonight. My CD burner wouldn't work, and a friend of mine gave me that advice. Why did it fix my problem? And why does it matter?

—Garret

The Doctor remembers a time, not long after compact discs were introduced, that audiophiles swore by a neat little trick that warmed up the sound of digitally reproduced music. All you had to do was color the outer 1/4 inch of your CD with a green Magic Marker. The explanation was that the refraction of the laser beam on the outer edge helped focus the beam, or brought out tonalities, or something like that. A lot of people did it, and sure enough, the music sounded warmer, richer, *fuller.*

"Probably the most common source of everyday PC misbehavior is loose or faulty cables."

The point is, you've been had. Probably the most common source of everyday PC misbehavior is loose or faulty cables. Although your empirical observation seems to lend credence to the idea that it matters which USB port you use, The Doctor, and Agent Scully, beg to differ. ■

Second Opinion

Bride of RAMDRIVE

In our June 01 issue, The Doctor explained how to use the RAMDRIVE utility included with Win9x to create an ultra-fast virtual hard drive from your system RAM. Like most DOS-based TSRs (terminate and stay resident), it's rife with limitations, not to mention that it's a deadly place to put important data. But it's to be expected that the intrepid readers of *Maximum PC* would root out some good alternatives to RAMDRIVE and, in this case, some great ones.

Astute reader Kyle Himmerick wins a year's supply of Turtle Wax for pointing The Doctor to RamDisk9x/ME and RamDiskNT from John Lajoie Consulting (www.jlajoie.com). These inexpensive shareware utilities are Windows port drivers that can configure a RAM drive as big as 2GB in size, and they're packed with some pretty amazing features. RAM disks can be assigned any drive letter, formatted with FAT32, and made bootable. And the utility includes a handy disaster shield by writing the RAM disk image to your hard drive at any interval you specify. The web site lists some interesting applications for the drive, including storing your saved games for quick loading later, processing audio files, and even speeding up your SETI project processing by 20 percent. On a whim, The Doctor ran our *HDTach* benchmarking tests on RAM disks we set up in WinME and Win2000. Brace yourselves—The Doctor recorded an average throughput of 1.25GB/sec. That's right, *gigabytes*. Oh, and the access time? Zero—0.0, to be exact. Can *your* hard drive do that?

Reader Mark Pevahouse plundered the Microsoft Support web site to produce this guide to using Microsoft's RAMDRIVE within Windows 2000: http://support.microsoft.com/ support/kb/articles/Q257/4/05.asp. The URL even includes a link to download RAMDRIVE if you can't find it on your Windows installation disc.

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How To...

A step-by-step guide to tweaking your PC experience

Protect Your Privacy Online

BY WILL SMITH

You may think you already know the basics of safe Internet use—never give a credit card number to a site you don't trust, never give out sensitive information unless you're on a secure site, and never do your banking online without using 128-bit security. But there are other Internet interactions that can open you up to privacy risks—and ad banners lie at the root of the problem. Large ad-banner-serving companies such as DoubleClick and AdClick can attach cookies to their advertisements, which are seen by a staggering number of web surfers. DoubleClick alone serves more than *half a billion ads a day*. These cookies (small text files that are stored on your computer) allow an ad-banner company to track your movements across the web, noting—and possibly recording—every single site you visit that carries one of the company's ads. You don't even have to click on the ad to load the cookie on your PC; the cookie is loaded as soon as you visit the page containing the ad.

Most browsers offer the option to disable cookies altogether, so why not just shut them off for good? Because, though you'd be foiling nefarious advertisers, you'd also be shutting yourself off from such valuable functions as storing your preferences (e.g., your user name and password information) on sites you visit regularly. And without cookies, online shopping becomes utterly infeasible. For example, cookies enable you to browse through a site like Amazon.com in several different browser windows, and still have all of your purchases end up in the same shopping cart.

When a site like Amazon.com uses a cookie to track your online preferences and movements, the information stored in that cookie is only accessible to servers in the same domain—that is, only Amazon.com's servers have access to the information stored in Amazon.com's cookies. Companies like AdClick and DoubleClick place cookie-fied banners on thousands of different sites, but because the banners are all being served by the same server, the cookies attached to them are all accessible to that server. When you browse sites that are adorned with ads served by AdClick and DoubleClick, you're leaving a trail that tells those companies exactly where you've been. This seemingly harmless demographic information allows ad-banner companies to target their ads to your interests, but they also give the ad companies a record of the sites that you visit. Sure, you could just disable cookies, but then you'd lose the functionality that they provide. If that's not enough, web server software logs information about visitors to different web sites. How can you keep them from storing information about you? We'll show you how to protect your privacy online.

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Just another harmless web site, right?

The Digital Bits (**www.thedigitalbits.com**) is a great place for up-to-date news and reviews of hundreds of DVD titles. But it also provides us with a great example of the different ways your private information is disseminated without your knowledge. Interestingly, most of the user information gathered at The Digital Bits isn't being collected by the owners of the site, but rather by the company that's serving the ads on the site.

Step back: Did you click a link to get here? If you did, you should know that both the site you came from and the site you are presently at can record all the details of your journey in their server logs, including the time you spent viewing each page and the total time you spent at each site. Do they do anything with the information? Probably not. But make no mistake: if you visited Halitosis.com before jumping to Maximumpc.com, we *do* have the ability to know you're concerned about bad breath (we just don't check for this information, because we have better things to do then track your hygiene habits).

Grasping at straws: With ad-banner sales in the toilet, ad companies are doing everything they can to drive up traffic. These utility bars might offer some nifty options, like a search engine or a news ticker, and they usually stretch across the top, sides, or bottom of a web page, where they look somewhat innocuous. But guess what? If they're there at all, they probably have a cookie attached to them, which means they're allowing an advertising network to track your clicks.

Not everything is as it seems: These two badges look a lot alike, but they're very different. The bottom badge links you to an article within this site. The top badge is actually an ad disguised as a badge. Clicking here not only sends you to a page where you can purchase the Tom Hanks movie *Cast Away*, but also tells that movie reseller where you came from and what page you were at when you clicked the badge.

Badges: These pictures that link to something are commonly used as navigation tools, either within a site, or to other affiliated sites. But guess what? They can be used to gather all the same cookie information that an ad banner can. Thus, it may appear that a site has no banner ads on it, but the site itself may have attached a cookie to its navigational badge. (Note: Badges on The Digital Bits don't happen to do this.)

Banner-ad blowouts: Though the bottom has dropped out of web advertising, we still see plenty of these 468x60-size GIF annoyances. Cookies attached to these bad boys allow companies that serve the ads to see exactly where you've been, from the sites you visit most frequently to your quick perusal of the "minor skin irritations" page on the WebMD site. This information is used to target you with ads that seem to fit your profile. Say you check out a page on lice at WebMD. Next thing you know, you see nothing but ad banners for lice-fighting shampoo.

You can foil the attempts of advertisers to collect your personal data by using one of three types of applications: cookie management apps, sweeper applications, and firewalls and proxy servers. Each serves a different purpose in your battle to protect your private information.

Cookie Cutters

Your browser stores all cookies in one place, which makes it simple for a third-party app to work on your behalf keeping an eye on them. We like *Cookie Wall*, a free app from AnalogX (**www.analogx.com**). It allows you to specify domains from which you will always accept cookies (such as sites where you want your preferences and shopping information to remain intact) and domains from which you will always deny cookies (such as sites that serve ads). It will also notify you when new, unknown cookies are set.

The only downside to programs like *Cookie Wall* is that you need to go through *all* the cookies on your system—their numbers could reach into the hundreds—and decide which ones stay and which ones go. For some help deciding which cookies to ban, check out the Worst Offenders sidebar to the right.

WORST OFFENDERS

Unfortunately, we can't provide a comprehensive list of web advertisers, but we can give you a list of the most notorious offenders whose cookies will almost certainly bring no good to your life. You'd be wise to banish these eight ne'er-do-wells without a second thought.

- **Doubleclick.net**
- **Advertising.com**
- **Admonitor.com**
- **Fastclick.net**
- **Flycast.com**
- **Hitbox.com**
- **Tripod.com**
- **Valueclick.com**

Sweep Away Your Online Footprints

Depending on your settings, your web browser stores info about sites you've recently visited in two different ways. The History folder keeps links to the sites you've been to, while the cache folder actually stores little snippets of HTML and image files from web sites to help pages load faster. Closet porn aficionados will want to keep both these folders cleared out, especially if their computers are accessible to other people. Applications that take care of cleaning those folders will also clear your cookie info, à la Cookie Wall.

To sanitize your browser's history and cache folders, we recommend *Window Washer 4.0*, from Webroot.com. *Window Washer* will not only remove user-specific data from your browser, but also from Windows Media Player files, including cookie information. Of course, *Window Washer* isn't free, but if you need your history protected, $30 isn't a lot to spend.

Firewalls, Proxies, and Server Logs, OH MY!

Although most people don't know it, every site on the net has the ability to store your computer's unique IP address in a file called a log. A site's log can contain information such as the site you viewed immediately prior to visiting the present site (called a referrer) and the sites you go to afterward. If you don't want your company's IT weenie to know that you were perusing a competitor's job listing right before you hit your own company's intranet site, there are several ways to hide your IP address and referrer information. In addition to protecting you from hack attempts, some personal firewalls include features that suppress referrer information or block ads, but aren't able to hide your IP address. Unfortunately, in order for a firewall to block your IP information, it needs to run on a computer *other* than the one you use for browsing.

To get around this, check out Safeweb.com or another online proxy server. By browsing within Safeweb's site, you use its proxy server to disguise your IP information, as well as any referrer info or cookies that might be sent to you. Safeweb also blocks standard banner ads and the annoying pop-up ads that have been making appearances all over the net lately. If you absolutely, positively don't want anyone to know who you are, do your web surfing through Safeweb. ■

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In the Lab

A behind-the-scenes look at Maximum PC testing

Benchmarking "Outside the Box"

You don't need expensive meters, scopes, and testing applications to probe your PC's performance

Punching through benchmarking brainblock, one application at a time.

All hardware that enters the Maximum PC Lab must face a thorough once-over from our set of standardized benchmarks. But when it comes to writing product reviews, even a thorough dissection of benchmark performance leaves us with little more than a few paragraphs of dry numbers—and these numbers don't really speak to the issue of how *real* people use *real* PC hardware in *real* life. So, when testing products, we're compelled to do much, much more than just run automated benchmarks that spit out cold, heartless scores.

Enter reader John Lawrence, who wrote in to suggest that we use real-world audio effects to evaluate system performance. Not a bad idea, John. After all, just like 3D visual effects, many audio processing effects can be extremely floating-point intensive and can quickly overload a system's resources. By seeing how many audio effects a PC can process simultaneously, John thinks we can learn much about a system's performance—and we're inclined to agree. John pointed us to **www.digitalnaturalsound.com/logic_dsp**, which outlines how to use real-world audio effects in the MIDI sequencing application *Logic Audio* to benchmark system performance.

John's letter reminds us of how often we use real-world applications in all phases of our Lab regimen. One of my favorite system-evaluation schemes is based on Sonic Foundry's *Sound Forge 5.0*. Besides using its audio-processing features during soundcard and speaker testing, I use *Sound Forge* to create files that are used in data-transfer tests for optical drives, hard drives, and networking hardware. One minute of CD-quality audio in WAV format takes up 10MB of hard-disk space. With that formula in mind, I can quickly create any size file I need for data throughput tests. A 95MB file? No problem—I simply create an audio file that's 9.5 minutes long. Perhaps most importantly, WAV files don't compress easily, so using WAV files for throughput testing effectively stymies storage devices that use data compression schemes to artificially improve performance. Also, if you create the WAV file using a "pure" tone (like a sine wave), you can easily spot data corruption in that file in *Sound Forge*. (Once the WAV file has been copied to its destination drive, I check it in *Sound Forge* for distortion.)

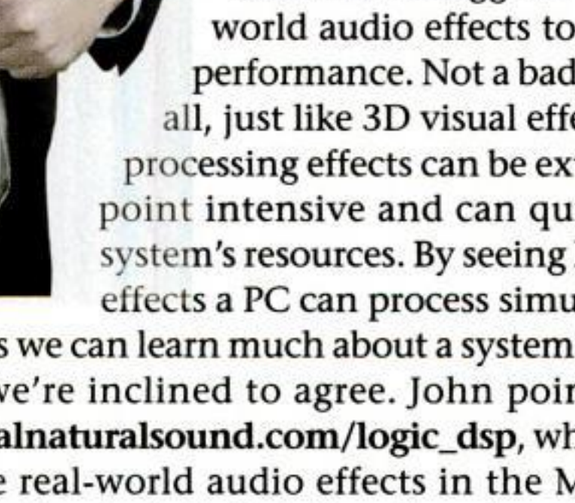
I'm not the only one who uses conventional software in unconventional ways. Senior Editor Gordon Mah Ung likes to run *Windows Media Encoder* to gauge overall system bandwidth. To test your system at home, just use a stopwatch to time how long it takes to convert a WAV file to Windows Media format. The fastest system Gordon has tested in this way—a 1.7GHz Pentium 4 rig—took 23 seconds to encode a 5-minute WAV file at a 128Kbps bitrate. Windows Media Encoder is a multi-threaded utility, so it comes in handy when evaluating dual-proc systems.

Dreaming up crafty ways to measure hardware performance sure beats running the same benchmarks over and over again. All it takes is imagination, a stopwatch, and some basic PC smarts.

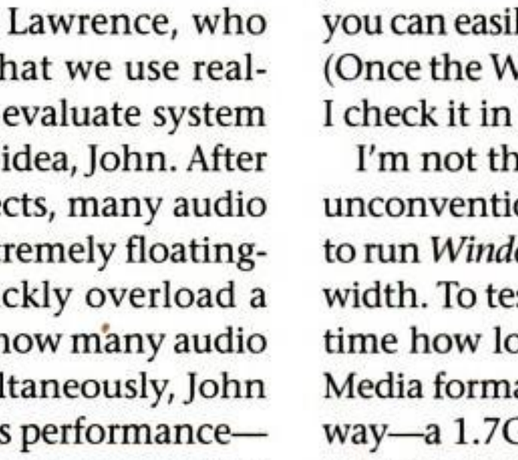
—ROB PRATT, REVIEWS EDITOR

The S. S. Shartung

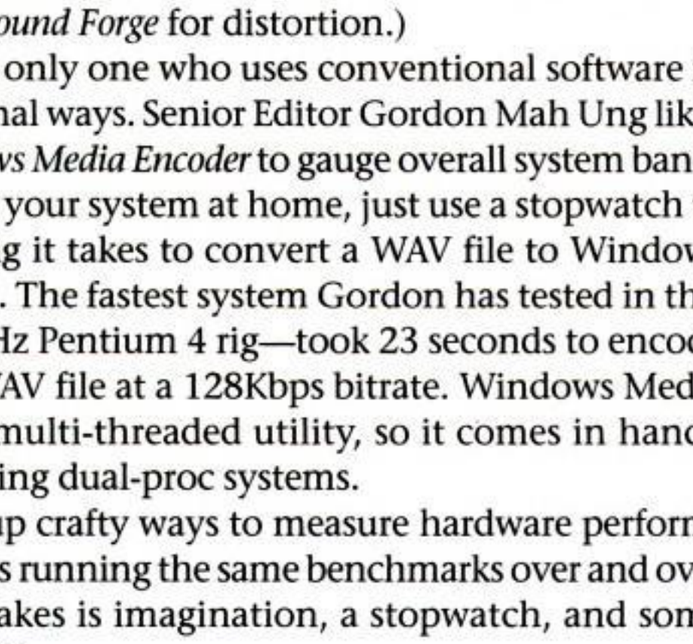
Magazine publishing can be very exacting work. Here at *Maximum PC*, we are beset by short production cycles, strict deadlines, and the critical scrutiny of our readers. To stay on top of things, we have to run a tight ship. And sometimes that requires creative measures.



We thought Will's "fuzzy math" debacle was finally over. But the letters refuting his calculations keep pouring in.



The amount of time consumed by reading all the angry reader correspondence is getting out of hand. How can we keep Will from making this sort of careless mistake again?



Doh!

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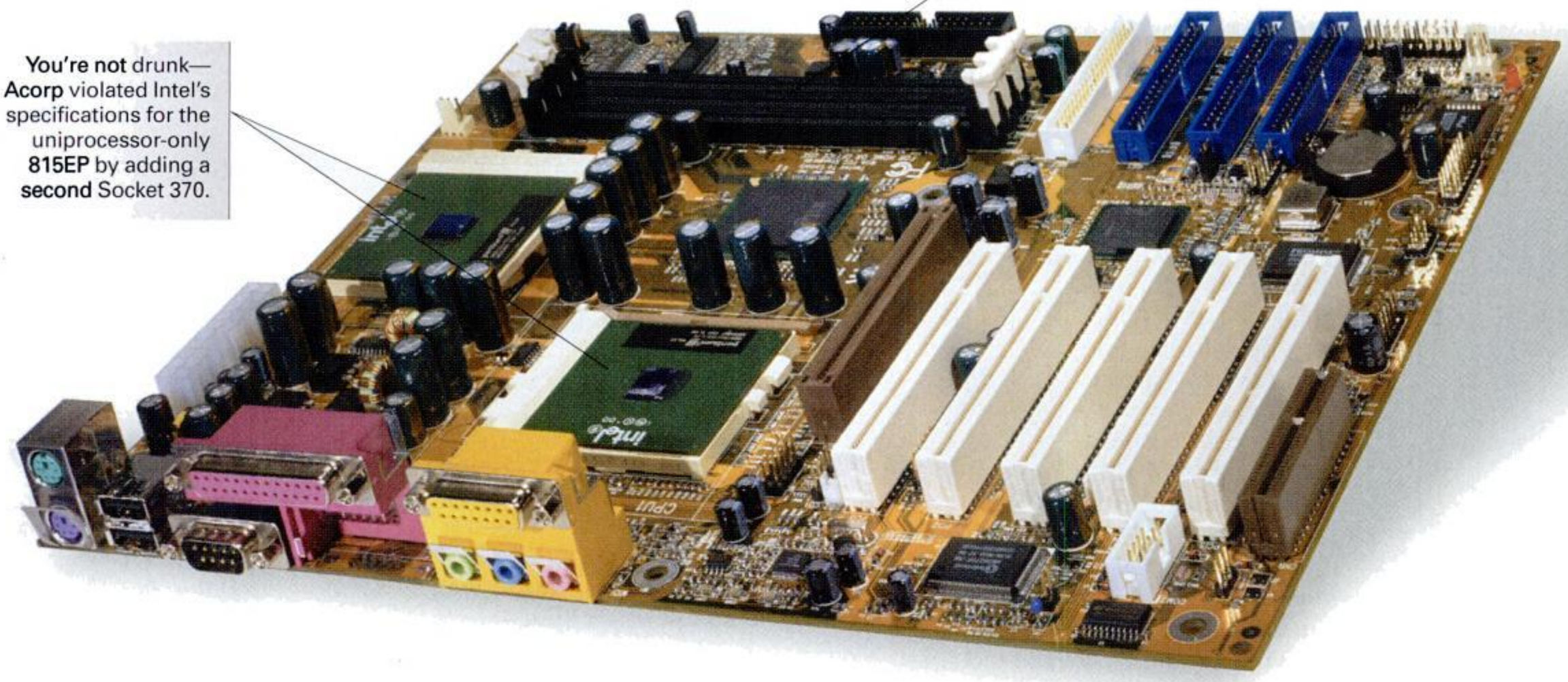
Dual, Dual Summer

Acorp's mobo taps a single-proc chipset for dual-proc duties

The 815EP's main weakness as a workstation or server chipset is its limited 512MB of memory support.

You're not drunk—Acorp violated Intel's specifications for the uniprocessor-only 815EP by adding a second Socket 370.



Well, well, what do we have here? It seems to be a dual-Socket 370 motherboard. Fair enough. After all, one can never have too many dual Pentium III boards in the Maximum PC Lab. But, wait a sec, what's that? Oh, no, they didn't. *No, they didn't!*

Uh, yes, they did. Acorp's strange new 6A815EPD motherboard is actually based on Intel's 815EP chipset. Have the folks at Acorp gone completely insane?

Intel has never, ever sanctioned the 815EP chipset for use with two CPUs. But, by the same token, Intel has never, ever said this zany little trick is beyond the scope of comprehension. Acorp, for one, thinks the 815EP is up to the dual-processing task.

The mobo is geared for enthusiasts who want to tear apart their existing P-III-based systems and build a dual-proc machine without buying new memory and power supplies. The board features just the basics: ATA/100 support, PC100/133 support, two Socket 370 connectors, onboard AC97 audio, a single serial port, one parallel port, and two USB ports. Acorp has also embedded a lite version of the Promise Fast Track 100 RAID controller that handles both RAID 1 and 0. A universal AGP slot, five PCI connectors, and a CNR slot round out the package. Total price: $130.

The 6A815EPD's Award BIOS offers a moderate level of control over basic system setup. You get manual bus-speed settings and clock multipliers, but the controls don't give you the granular clock and bus control you'd find in other enthusiast boards.

For comparative testing purposes, we used two 1GHz Coppermine P-IIIs (the fastest P-IIIs available). A matchup against the new dual-Athlon platform—which uses 1.2GHz processors—was no contest. The Athlon multiprocessor rig won, of course, but the Athlon system does have a faster system bus, not to mention DDR memory.

Many people will compare the 6A815EPD to Abit's BP6 dual Celeron board, which was a cult hit among the crowd that thinks symmetric multiprocessing is chic rather than utilitarian. The BP6, too, violated Intel's wishes.

The 6A815EPD's main weakness is its inability to address more than 512MB of RAM. That's not Acorp's fault, however. Intel never designed the 815EP chipset for workstation or server environments that would demand lots of memory. But because SDR memory is so cheap right now, and because Windows 2000 and Windows XP can handle gigabytes of memory, many enthusiasts will want to run more than 512MB of RAM. The 6A815EPD motherboard may also be hurt by the fact that Intel's upcoming Tualatin P-III will require the new "B" version of the 815 chipset. Acorp representatives say the board supports Tualatin, but, seeing as we don't yet *have* a Tualatin, we couldn't verify this claim.

So where does this board fit in the grand mobo scheme? We're afraid it warrants only limited interest. Multiprocessor Athlon systems offer a better roadmap for upgrades, and mobos using VIA's Apollo Pro 266 offer dual Socket 370 *and* DDR memory support. But the 6A815EPD does make sense for people who want the rock-solid stability of an Intel chipset, support for PC133 memory, and a 133MHz frontside bus—and who don't want to overclock their CPUs.

—GORDON MAH UNG

DARE TO COMPARE — DUAL P-III VS. DUAL-ATHLON

	Acorp 6A815EPD 2x 1GHz P-III	Tyan Thunder K7 2x 1.2GHz Athlon MP
SYSmark2000	210	230
Quake III Arena MPC Demo	44.7 fps	46 fps
Premiere 6.0	212 sec	143 sec
Photoshop 6.0.1	91 sec	61 sec
SiSoft Sandra 2001 CPU	5389 MIPS	4554 MIPS
SiSoft Sandra Memory Bandwidth test (ALU)	359MB/sec	913MB/sec

6A815EPD: Dual 1GHz PIII, Windows 2000 with SP1, GeForce2 Ultra, Sound Blaster Live! X-Gamer 5.1, 384MB CAS 2 PC133 Crucial Technologies RAM, 52x Kenwood True-X CD-ROM, 30GB IBM 75GXP.

Tyan Thunder K7: Dual 1.2GHz Athlon MP, Windows 2000 with SP1, GeForce2 Ultra, Sound Blaster Live! X-Gamer 5.1, 512MB CAS 2.5 PC2100 registered Crucial Technologies DDR SDRAM, 52x Kenwood True-X CD-ROM, 30GB IBM 75GXP.

Yamaha 20/10/40

CD burning goes to Mach 20

With the fastest burning times we've ever recorded, the Yamaha 20x leaves the competition humiliated and despondent.

Type-A folks know that every minute counts, so they'll no doubt be lining up for Yamaha's 20x Light Speed 2 CD-RW drive, which boasts state-of-the-art recording speeds and blew away our speed records for digital audio extraction and CD burning. But all is not rosy with the new Yamaha drive. We advise you to take a close look at all of the drive's benchmark results before taking the plunge.

Using *CDSpeed 99* as our benchmark, the Yamaha drive returned recording rates slightly below its advertised 20x performance rating, but still took the gold with an average write speed of 18.45x, which is faster than any other drive we've tested. But the real excitement was in our real-world trials, where we validated Yamaha's bold claim of ripping an entire audio CD in less than three minutes. We ripped a 72-minute CD in 2:53. Just to be sure, we tested audio extraction on two more stamped CDs, and recorded results within seconds of the first test run. The Yamaha 20x then brazenly crushed our audio and data CD recording speed records, burning 72 minutes of audio in 4:44 and 647MB of data in 4:51. Even the slow process of burning rewritable media gets a boost—copying 540MB of data took a mere seven minutes.

THE BUNDLE

Ahead *Nero 5.5*, Ahead *NeroMix*, Ahead *InCD*, Ahead *Nero Tool Kit*, Ahead *Nero Cover Editor*, Ahead *Nero Wave Editor*, Adobe *ActiveShare*, Adobe *PhotoDeluxe*, Neato *CD Label Creator*, *MusicMatch Jukebox*

BENCHMARKS

Average data transfer (MB/sec)	24.0
Random/full-stroke seek (ms)	127/221
Audio extraction (min:sec)*	2:53
Data CD burn (min:sec)**	4:51
CPU utilization (at 8x)	11%

*Test performed on a 72-minute audioCD
**Test performed with 647MB of data files

The Yamaha 20x drive, like its 16x predecessor, reads and writes using a method called partial constant angular velocity (PCAV). Most optical drives read and write using either constant linear velocity (CLV) or constant angular velocity (CAV). CLV drives continually adjust the disc's rotation speed to maintain a constant data transfer rate. CAV drives spin discs at a constant rate, which means that data transfer reaches the highest rate at the outer edge of the disc. When writing to CD, Yamaha's PCAV method uses CAV near the inner edge of a disc, then switches to CLV, throttling up the rotation speed to 20x as the recording head moves further toward the edge.

At these speeds, drives need foolproof buffer-underrun technology, and, unfortunately, the old16x's beefy 8MB buffer failed to prevent buffer underruns when we executed routine computing tasks during burns. But the new Yamaha has SafeBurn technology—a triumvirate of coaster-busting features, one of which pauses the laser if the buffer runs dry, then resumes the burning process once the buffer has been refreshed.

Yamaha fine-tuned this drive in other areas, as well. RAW-mode reading and writing are now supported, providing better odds for making game backups. And the frightening T-Rex roar of the 16x drive mechanism has been muffled to a hum in the 20x drive. Yamaha has also dropped Adaptec's cumbersome *Easy CD Creator* and *DirectCD* in favor of a superior software suite centered around Ahead's *Nero Burning ROM*. The Ahead bundle includes *Nero 5.5*, *NeroMIX*, a stand-alone audio player, *InCD* for CD-RW support, and a layout program for creating CD labels and inserts. Full versions of *MusicMatch Jukebox*, Adobe *PhotoDeluxe*, and Adobe *ActiveShare* are also included.

And now we turn to the other side of the coin. The Yamaha 20x may be the fastest scribe, but it turned in only slightly better than average scores elsewhere. Random and full-stroke seek tests returned rates of 127ms and 221ms, respectively, a scant improvement over most 16x drives and even slower than Ricoh's 12x! Spin-up and spin-down times just over three seconds each can be frustrating, and the disc recognition time of 5.67 seconds is awful. A number of times, the crotchety drive also refused to release our disc when we punched the eject button.

These quirks and foibles keep the drive from being the top-notch product it might have been, but there's no question that the Yamaha 20x provides record-breaking speed without back-breaking prices.

—LOGAN DECKER

MAXIMUMPC VERDICT

CRW 2200EZ
YAMAHA

+ WHAT WE LIKE

Yamaha improved this drive over the 16x in almost every way, with record-breaking speeds, top-of-the-line software, and robust buffer-underrun protection.

– WHAT WE HATE

The 20x still suffers from relatively sluggish access times for such an otherwise fast drive and displays mysteriously poor responsiveness to disc commands.

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"The Roswell oozes speed from every port, it's flat-out fast."

- Videomaker Magazine 2001

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SoundBlaster LIVE! 3D Sound Card
Cambridge FPS2000 Digital 5-Piece
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Micron Millennia MAX XP2

Better late than never

Micron was late to the ballpark, but the MAX XP2 can still play.

Back in the day, the Micron name was synonymous with cutting-edge hardware. The PC vendor had a knack for integrating the latest, greatest parts into its highest-end systems and consistently trumped more conservative vendors that couldn't quite accommodate power users in a timely fashion. Bottom line: If you wanted a mass-market PC with the hottest videocard, memory, or plutonium-powered anti-matter discombobulator, you bought a Micron.

But then the competition picked up its pace, and Micron suddenly became much less remarkable. Shoot, in some cases, Micron even fell behind the performance curve. Take the company's newest offering, the Millennia MAX XP2: It's the first Micron rig to offer DDR memory, yet we've been playing with DDR-based Athlon systems since May.

Are we thoroughly dejected? Hell, no! Boasting some of the best Athlon benchmark scores we've ever seen, the XP2 was worth the wait.

Based on a 1.4GHz Thunderbird Athlon processor, the XP2 comes with 256MB of DDR memory and a GeForce3 videocard. Micron initially promised a DDR Athlon system late last year, but motherboard bugs held up the company's move to double-data-rate memory. The XP2 reaps the benefit of bug fixes in the form of overall stability and increased performance.

For the XP2, Micron ditched its once-cutting-edge Utopia case for a slightly less rounded enclosure from Flextronics. This new case has two front-mounted USB ports and extra drive rails; gone is the annoying fold-down door that once covered the front-mounted optical drives. Inside the box, the XP2 is squared away like a Marine Corps barracks. The interior isn't detailed with the compulsive tidiness of a Voodoo PC rig, but for an assembly-line PC, the wiring is the cleanest we've ever seen.

During benchmarking, the XP2 turned in admirable scores, even outgunning the 1.4GHz Polywell Poly 880K7-1400 (reviewed last month) in some categories. The Poly has twice as much memory, a more robust OS (in the form of Windows 2000), and an IDE RAID hard-drive configuration, but the Micron XP2 shaved a minute off the Poly's time in our digital-video rendering test. The XP2 also smoked the Poly by about three minutes in our audio extraction test.

In *SYSmark2001*—which measures how fast a PC executes typical workloads in a dozen popular Windows applications—the Polywell remains at the top of the Athlon heap with a score of 168. The XP2's score was 144, but that's still about 30 percent faster than our zero-point 1.3GHz Pentium 4 system.

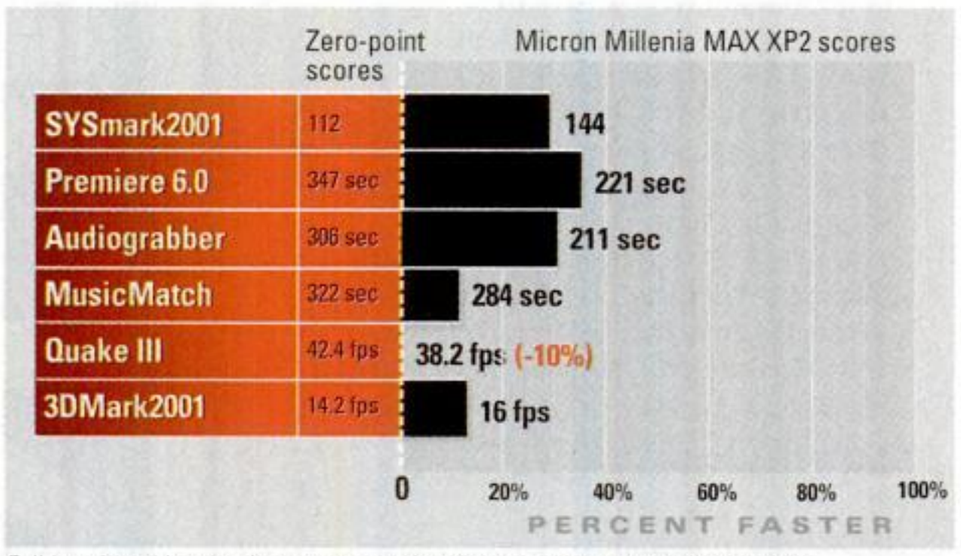
Micron's storage and audio are good but not great. A single 60GB IBM Deskstar handles hard-drive storage duties, and a 12/10/32 CD-RW and a DVD-ROM drive (both from NEC) handle optical chores. On the audio front, the XP2 boasts a Sound Blaster Live! Value soundcard and a set of perfectly respectable Altec Lansing ACS56 speakers. The digital output connector on the soundcard doubles as an analog-out connector for use with an analog 5.1 speaker system.

When Micron Technologies sold off Micron PC, the system-making arm of the company might easily have withered and died. But judging by the solid performance of the XP2, that's clearly not the case. The XP2 doesn't boast a bunch of dancing bears and cartwheeling clowns in the form of a RAID array, DVD-R drive, or even state-of-the-art CD burning, but the rig does include the fastest Athlon CPU/memory combination available.

—GORDON MAH UNG

UNDER THE HOOD

THE BRAINS	
CPU	1.4GHz AMD Athlon
RAM	256MB PC2100 DDR SDRAM RAM
I/O ports	Four USB, two serial, one parallel, PS/2 keyboard and mouse
DISPLAY	
Videocard	VisionTek GeForce3 64MB DDR
Monitor	19in. Micron 900Mx (18in. viewable)
Refresh @max res	85Hz@1600x1200
STORAGE	
Hard drive	60GB IBM Deskstar, 7200rpm
DVD-ROM	NEC DV-5800A 16x DVD-ROM
CD-ROM	NEC NR-7700A 12x10x32 CD-RW
NETWORKING	
LAN	SMC 10/100 Ethernet PCI card
Modem	Generic 56K PCI Win Modem
SOUND	
Soundcard	Creative Labs Sound Blaster Live! Value
Speakers	Altec Lansing ACS56
THE BUNDLE	
Windows Millennium, Microsoft *Office XP Standard, Easy CD Creator 4,* Intervideo *WinDVD 2000*	
BOOT: 42 sec.	**DOWN: 7 sec.**



Full benchmarking details at www.maximumpc.com/benchmarking/index.html

MAXIMUMPC VERDICT

Millennia MAX XP2
MICRON PC

WHAT WE LIKE

The CPU/memory combo is tops among Athlon-based configurations. We also dig the clean case interior and boffo digital-video scores.

WHAT WE HATE

Too many subsystems fall short of state-of-the-art. The mini-ATX case, memory-slot situation, and weak, 250W power supply leave little room for upgrading.

800.224.4247 | www.micronpc.com
$2,700

7

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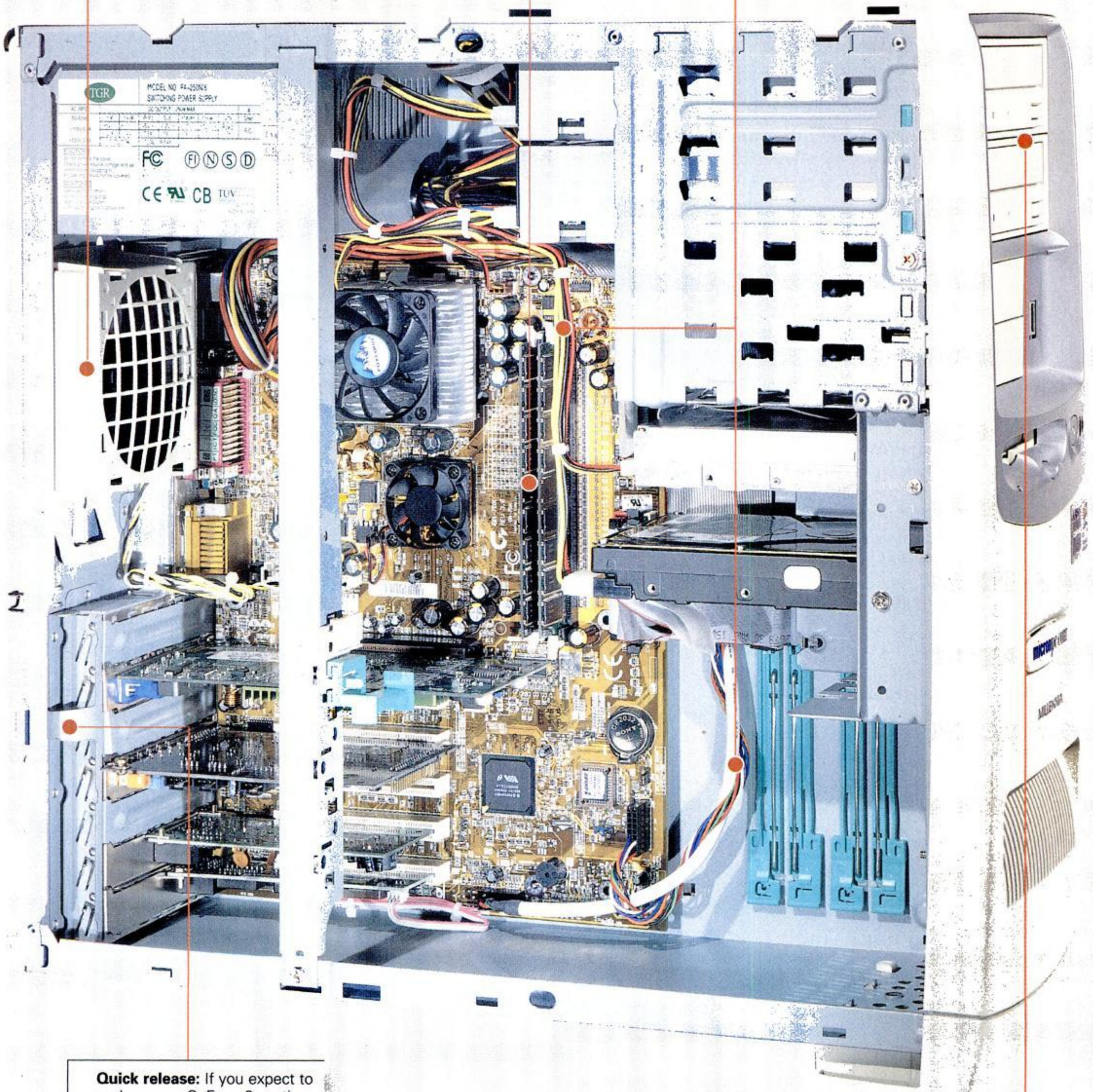
Athlons need adequate cooling: This rear fan and the squared-away wires let air properly flow from the front to the back and outside.

No vacancies: Fitted with two 128MB DiMMS, the board's dual DIMM slots are maxed out. Want to upgrade? You'll have to toss a module.

'Ten *hut*! We don't usually expect this kind of attention to wiring from a big PC maker. But can Micron deliver this on every machine?



Quick release: If you expect to replace your GeForce3 anytime soon, the MAX XP2 lets you do it in a hurry with a quick-release latch for add-in cards.

Out of bays: Micron's mini-ATX case is probably good for most, but we'd really like just one more full-size drive bay.

Wireless Walkabout

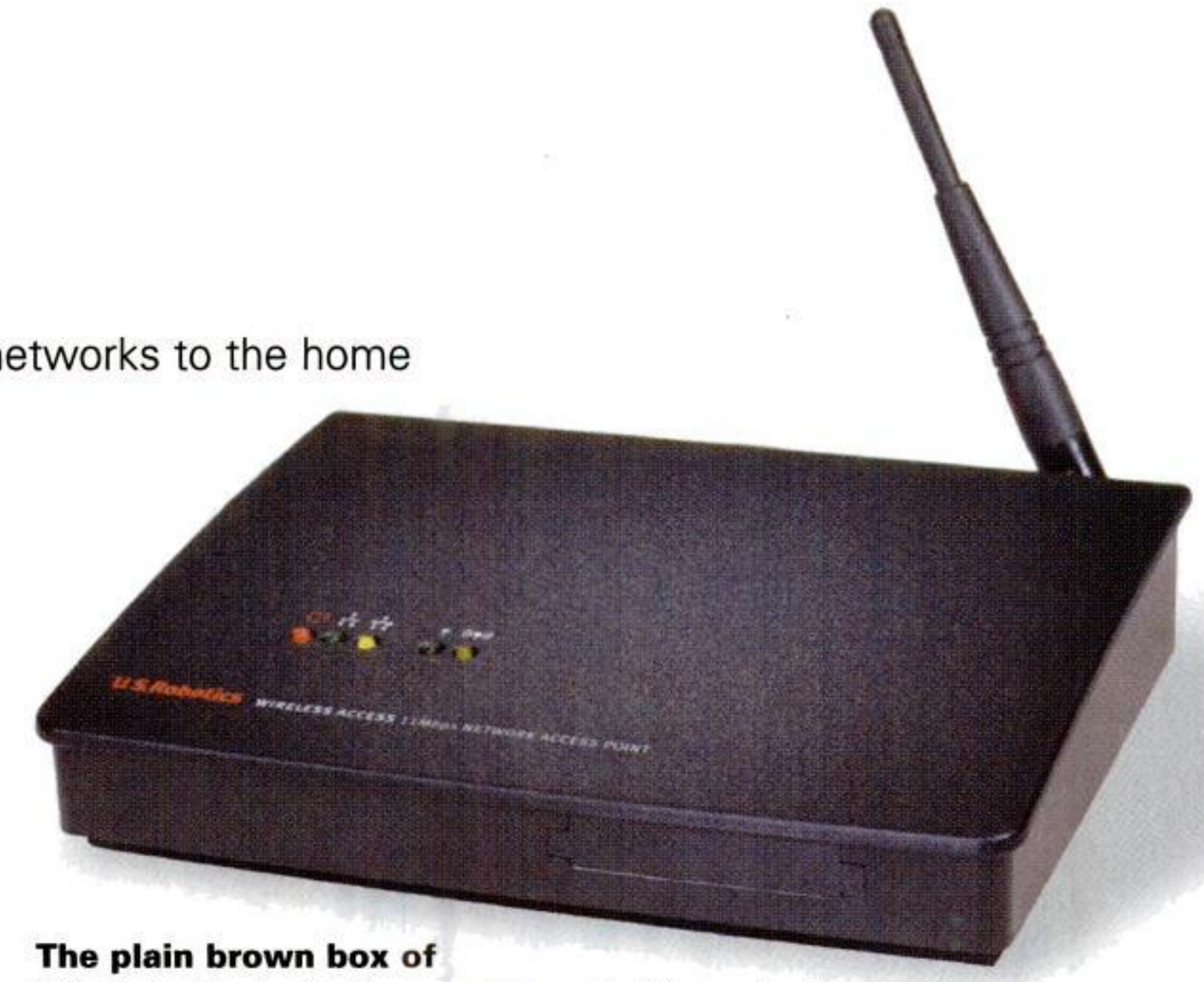
Three new access points bring simple wireless networks to the home

A wireless network won't let you surf the Internet while you're sunning yourself on a park bench—at least not yet. But now that college campuses, hotels, and even Starbucks are offering wireless bandwidth with better-than-DSL speeds, it's only a matter of time.

The wait is over if you want to carry wireless access home from school or the office along with your laptop. Three new wireless access points from Xircom, U.S. Robotics, and Netgear let you quickly and inexpensively connect a wireless network to your existing home network.

A wireless access point works a lot like a common, wired Ethernet hub. It uses a standard Ethernet cable to connect to your existing local area network. Once you configure the access point with some basic information about your network, dozens of PCs with wireless Ethernet adapters can share up to 11Mbps of wireless data bandwidth. For wireless adapters, laptops use a wireless Ethernet PC card. Desktop systems use a PC card plugged into a PCI adapter card.

All of the access points reviewed here claim an effective range of 300 feet, which is more than enough for even a sprawling house. Best of all, they're not too complex for the average user. If you've already set up your home network to work with a DSL or cable modem that acts as a router, then you won't have any trouble understanding how to configure these simple access points.



The plain brown box of U.S. Robotics' wireless access point is packed with handy features for troubleshooting and tweaking network settings.

RAW DATA — 30MB file transfer in seconds

	Xircom	U.S. Robotics	Netgear
Wired to Wireless	69	68	66
Wireless to Wireless	112	119	142

NOTES: Our wired-to-wireless test consisted of FTPing a 30MB file from a server connected to a local 100Mbit Ethernet port to a laptop using a standard WiFi-compliant PC card. For the wireless-to-wireless test, the same file was FTPed from a server on the wireless LAN to another client on the same wireless leg. The time is reported in seconds. ***Lower scores are better.***

XIRCOM APWE1120-NA WIRELESS ETHERNET ACCESS POINT

Think of the swooping lines of the teleporter that Jodie Foster rode in the movie *Contact*, and you get an idea of the arcing silhouette of Xircom's APWE1120-NA wireless Ethernet access point. Instead of separating the transmit antenna and the receive antenna, or combining them into a single dual-purpose vertical antenna, Xircom connects them with a crossbar. Overall, the Xircom is the smallest access point we've seen. In fact, it's only about two-thirds the size of D-Link's DWL-1000AP, the next smallest.

Like most wireless access points, the Xircom uses a configuration application that you install on a wired PC to detect the access point and perform basic configuration. The configuration app runs on a machine with a wired Ethernet connection, and it can find all of the Xircom wireless access points hooked up to the same subnet. A wizard quickly steps you through the process of detecting network settings, locating the access point, configuring security and encryption settings, and then saving the settings to the access point's firmware. The main pane of the Xircom's configuration application features a tree display of all available access points. It closely resembles Windows Explorer, which makes it very easy to understand and navigate. Simply select the access point from the tree of wireless networking devices, then flip through tabbed dialog boxes to enter settings. Click "apply" to save the settings to the access point's firmware.

The Xircom equals and slightly exceeds the U.S. Robotics access point in our wired-to-wireless and wireless-to-wireless benchmarks, scoring at the front of the pack among wireless Ethernet (or "WiFi") devices. Our first benchmark gauges the access point's maximum one-way throughput. From a wireless client machine, we FTP a 30MB file from a wired machine. Our second test gauges the access point's performance in handling wireless data transfers in both directions. We take the same 30MB file and FTP it from one wireless machine to another wireless machine. Lower transfer times in this second test indicate better performance in two-way, full-duplex mode. In wireless-to-wireless transfers, the Xircom led the other two units reviewed, edging the U.S. Robotics by about five percent and the Netgear by about 30 percent.

Like the other two access points, the Xircom is spec'd for 300 feet of outdoor range—but its long-distance bandwidth fell short of expectations. On our wireless access point obstacle course, the Xircom scored about 200bps less throughput at all points, even when our client machine was only 10 feet from the access point.

Wireless *Contact*: Xircom builds a crossbar between the transmit antenna and the receive antenna, which makes the access point look like the contraption from the movie *Contact*. The funny antenna also helps the Xircom score high marks in our data-transfer benchmarks.

Copyrighted material

U.S. ROBOTICS USR2450 WIRELESS ACCESS POINT

The U.S. Robotics USR2450 features a single antenna, but with a more typical design than that of the Xircom unit. The USR also has the largest case of the three units reviewed here. Five LEDs show the access point's operational states: AC power, wired link, wired activity, wireless link, and wireless activity. The other access points feature only two pretty lights a piece! But the USR's extra LEDs do serve a purpose during troubleshooting. Indeed, trying to figure out an access point configuration problem is a lot like trying to determine the direction of the wind without a weather vane. The extra feedback from the USR unit proved invaluable while tracking down a problem with an Ethernet hub.

Like the other units reviewed here, the USR uses a configuration application that runs on a wired desktop PC. Simply install the wireless LAN access-point software on a wired machine, then locate the access point. Double-clicking the list entry for a found access point launches a browser-based configuration interface. It's that easy.

Once you've used the configuration application to set up the access point's unique IP, the browser-based configuration interface is a great way to tweak the access point's settings. You don't have to worry about installing the configuration application on new machines, or tracking down the one you used for the initial setup, if you need to make changes to the wireless network. Best of all, the web browser interface works from both wired and wireless clients.

There's no doubting the effectiveness and convenience of the USR's browser-based configuration; however, the pages that display configuration options are poorly organized. Related parameters are grouped on a menu bar, but sometimes critical configuration screens—encryption settings, for example—hide behind curious, cartoony icons.

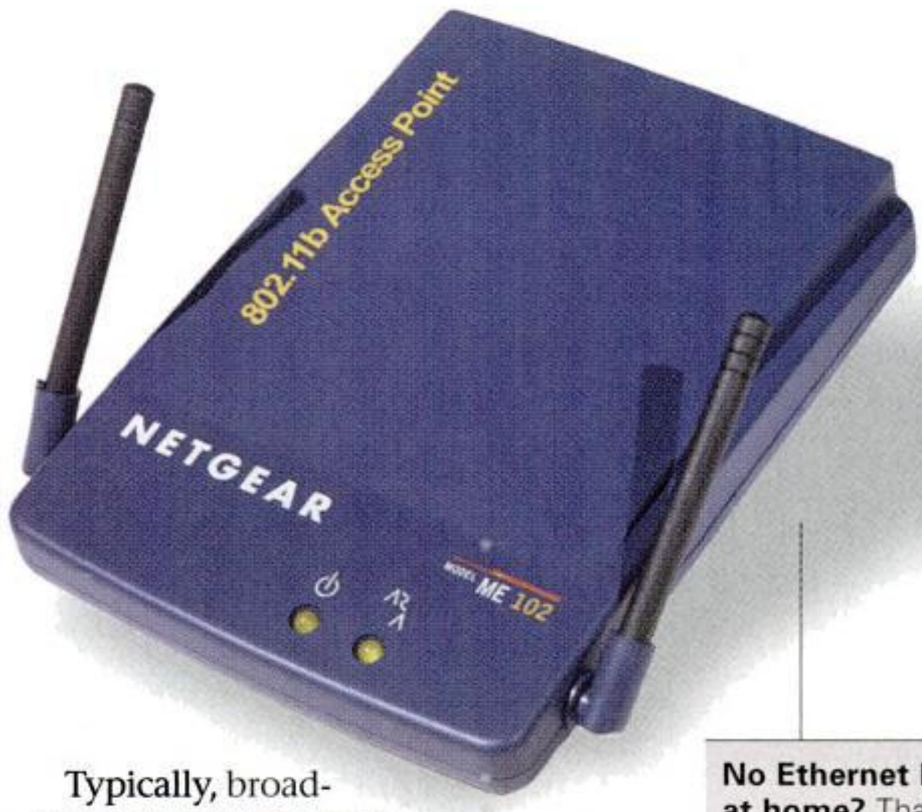
In our wired-to-wireless and wireless-to-wireless benchmarks, the USR unit tied the Xircom access point in overall speed. USR's access point also excelled at maintaining uniformly high bandwidth rates even when client machines reached the edge of the access point's effective range. Our wireless obstacle course tested throughput at several points across the *Maximum PC* offices, including a stretch that crosses an open-air atrium and rises one floor above the access point. While other access points lost throughput as the distance to the client machine increased, the USR maintained maximum bandwidth across two-thirds of our 200-foot obstacle course.

NETGEAR ME102 WIRELESS ACCESS POINT

Built into a small box that has small antennae sticking up from each corner, Netgear's ME102 looks like an archetypical wireless access point. The thin case is about a third larger than a standard, four-port Ethernet hub and has grooved edges and a royal-blue color scheme. The unit's dual LEDs and single Ethernet port are standard for access points. Flip around the Netgear access point, and you'll find an extra port for a USB connection on the back panel.

Initial setup works as quickly and efficiently as the other two access points. Plug the Netgear unit into an Ethernet hub, install the configuration software on a wired PC, detect the access point, enter your network's unique settings, and the access point is ready to go.

What sets the ME102 apart from the other two units is its USB port. For people with only a single Ethernet port for connecting to broadband Internet access, the Netgear access point's USB configuration option is the only way to go.



No Ethernet hub at home? That's not a problem for Netgear's ME102 access point. The bonus USB port lets you set up a wireless network without an Ethernet hub.

Typically, broadband Internet connections enter a home or a small office through a DSL or cable modem, which acts as a gateway. The modem/gateway then connects to an Ethernet hub so that all the other machines on the local area network have access to the Internet. But what if you only have one machine that connects directly to the DSL or cable modem? Then there's no way to use wired Ethernet to connect and configure a wireless access point—unless you can use another communication port, such as USB. Netgear's access point comes with a configuration application that works across a USB connection. Simply connect the ME102's USB port to a system with an open USB port.

During our file-transfer benchmarks, the Netgear ME102 lagged behind both the Xircom and the USR access points in two-way, full-duplex operation. For connecting to client machines that only do web browsing, the Netgear's slow full-duplex transfer times probably won't affect performance. However, the other two access points reviewed this month are better choices for wireless networks with more than a couple of clients.

—ROB PRATT

MAXIMUMPC VERDICT

APWE1120-NA
XIRCOM

+ WHAT WE LIKE
It's small and it's fast in full-duplex data transfers. As an added bonus, the swooping, C-shaped antenna makes us think of Jodie Foster in the movie *Contact*.

– WHAT WE HATE
You can't get too far from home with this access point. Bandwidth suffers when wireless client machines are even a short distance away.

888.576.9700 | www.xircom.com
$330
7

MAXIMUMPC VERDICT

USR2450
U.S. ROBOTICS

+ WHAT WE LIKE
Five indicator LEDs make for easy troubleshooting, and a web browser configuration interface makes tweaking your wireless network a snap.

– WHAT WE HATE
Tweaking a wireless network with a web browser is a great convenience—but not when you can't find settings because of poor page design.

866.287.7669 | www.usr.com
$330
9

MAXIMUMPC VERDICT

ME102
NETGEAR

+ WHAT WE LIKE
USB port for configuration is the only way to go for home networks with only one computer.

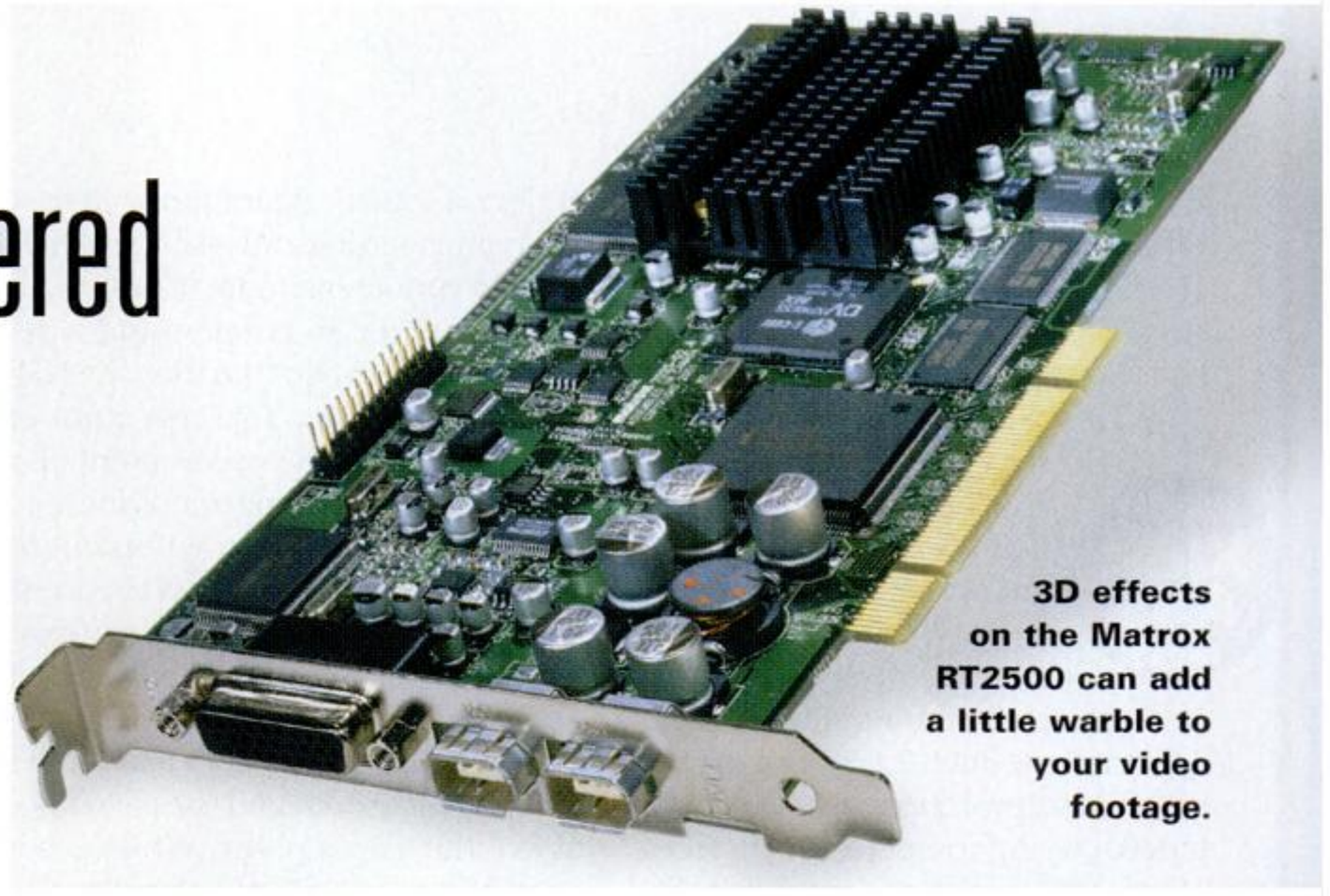
– WHAT WE HATE
Sluggish two-way data-transfer performance makes this access point only good for giving wireless access to a small number of computers.

888.305.7440 | www.netgear.com
$355
5

Copyrighted material

Capture Cards Considered

Souped-up FireWire capture cards and loads of effects for DVD DIY

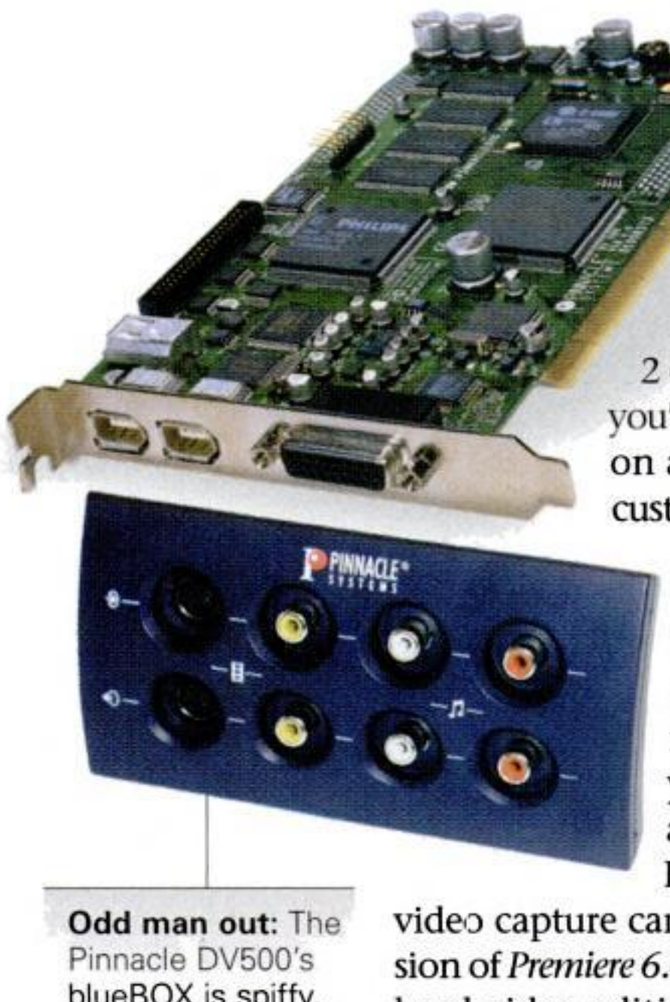


3D effects on the Matrox RT2500 can add a little warble to your video footage.

Want to make a digital movie? First you'll need to hash out a compelling storyboard, then you'll want to get your hands on a competent FireWire capture card.

You're probably already familiar with the video-capture features integrated into do-everything videocards such as the ATI All-in-Wonder. This bare-bones technology takes an analog video stream and encodes it as a digital file. Unfortunately, this process is prone to the same type of visual degradation that affects all analog-to-digital conversions. But a FireWire capture card eschews analog-to-digital conversion altogether by grabbing digital data directly from a digital source. Perhaps even better, a FireWire capture card can directly control the operation of your video-source device.

This month, we look at two fully outfitted prosumer DV kits. Once you have your footage inside your PC, you can use the kits' bundled software to liven up your video with snazzy special effects—all in realtime. The capture cards that come with these kits also include MPEG-2 encoder chips, which you'll need if you're intent on authoring your own custom DVD movie discs.



Odd man out: The Pinnacle DV500's blueBOX is spiffy, but it won't fit into a PC case.

PINNACLE DV500 PLUS

Pinnacle's DV500 Plus includes everything you'll need to transfer and edit digital video. In addition to a FireWire video capture card, you get a full version of *Premiere 6.0* (Adobe's consumer-level video-editing app), as well as a package of effects and transition plug-ins that work with *Premiere*.

The DV500 capture card comes with two FireWire ports and a connector for a "blueBOX" connector breakout. The blueBOX comes with S-VHS input and output connectors, and three pairs of RCA connectors for composite input and output. The composite jacks let you import and export footage from your stereo VCR. We performed pirouettes over the generous length of cable that attaches the blueBOX to the capture card, but we were disappointed to find that the end of the cable with all the A/V connections is shaped like a multi-outlet extension cord—we would have preferred a true breakout box.

When we transferred raw digital footage from a DV camera to the DV500 and simultaneously encoded the footage as MPEG, we were surprised by the excellent visual quality. Kudos go to the capture card's MPEG encoding chip. It produced better visual quality than software encoders and did so in easily half the time. Colors were well-saturated in our test footage, which ranged from 45-second clips to 20-minute captures.

Unfortunately, many of the *Premiere 6.0* plug-ins bundled with the DV500 Plus proved problematic for our Pentium 4-based test system running Windows ME. *Premiere* froze when we put titles onto a timeline, as well as when we exported a project to an AVI file.

For DV enthusiasts used to conventional FireWire capture, this represents a quantum leap in performance and a gigantic step forward in video quality. Only a surprising number of Windows ME bugs prevents us from giving the DV500 Plus an unreserved endorsement.

MATROX RT2500

The RT2500 is the follow-up to Matrox's two-card video-capture package, the RT2000. The RT2500 combines the RT2000's two separate cards (a PCI card for FireWire video capture and an AGP card devoted to 3D video transitions) into one all-encompassing card. The upshot is that you can now render all your 3D video effects over the PCI bus and save your AGP slot for a 3D-gaming accelerator.

The RT2500 includes a full version of *Premiere 6.0* and a smorgasbord of effects. The RT2500 also one-ups the DV500 by including Matrox's 3D rendering G400 Flex chip, which lets you create realtime 3D transitions.

During testing, the RT2500 produced crisper blacks and stronger color saturation than the DV500. However, we found that anti-aliasing (which comes into play during MPEG conversions) wasn't as smooth as on the DV500.

The RT2500 generally offers an improvement in video quality over the DV500, but requires a much more extensive configuration setup. Despite the extensive configuration and the steep price difference (maybe too steep just for the added 3D-effects features), the RT2500 delivers a package that'll get you going on your own masterpiece no matter which version of Windows you use.

—EDWARD CHAMPION

MAXIMUMPC VERDICT

DV500 Plus
PINNACLE SYSTEMS

WHAT WE LIKE
Surprisingly good image-capture quality comes in a tidy bundle, with all the hardware and software you need to start piecing together digital-video footage.

WHAT WE HATE
Got Windows ME? Sorry, no titles or AVI exports for you.

317.841.0332 | www.pinnaclesys.com
$700
6

MAXIMUMPC VERDICT

RT2500
MATROX

WHAT WE LIKE
3D layering, crisp blacks, and strong saturation give this card pro-level features at a consumer price.

WHAT WE HATE
Would George Lucas put up with all of this configuration before he started editing digital footage?

877.628.9669 | www.matrox.com
$1,000
7

Copyrighted material

Iomega's 10GB Peerless Drive System

This is no blue-light special

Imagine this blue Iomega light blinking at you for four hours, as you fill up one 10GB removable drive at a USB transfer rate of 1MB/sec.

Fans of the old Saturday-morning series "Ultraman" may recall that the giant light in the center of Ultraman's chest began to blink when the superhero was losing strength and running out of time. We feel pretty much the same way as we watch the huge blinking blue light in the center of Iomega's new removable media heavyweight, the Peerless Drive System.

The Peerless Drive System is essentially a hard drive separated into three portable components that snap together as easily as an IKEA chair. You get a base station resembling a small, pretentious toaster; a squat interface module that connects to your PC via USB; and a handsome 10GB or 20GB drive cartridge that's slightly larger than a PDA.

Iomega intends for your Peerless disk to eventually be used not only in your PC, but also in your Peerless-enabled car stereo, gaming console, personal video recorder (à la TiVo or Replay TV), and wherever else mass storage comes in handy. But until these vaporous devices finally condense, the Peerless system is just an external USB drive for portable storage. And that's where the vision starts to get a little blurry.

The strangest thing about the Peerless concept is that it seems designed to *foil* portability. You certainly wouldn't want to schlep around the whole lumpy system in your bag. That would mean setting up the drive, the base station (with all its essential electronics), the chunky interface module, and the cables every time you stop to work on a PC. In order to carry out Iomega's master plan, you'd need a base station at each computer you intend to transfer your data to and from.

We've got a few more bones to pick. Despite countless revisions over the years, the bundled *IomegaWare* continues to infuriate us with its poor multi-threading. It intermittently takes our system hostage while it performs file transfers that *should* happen unobtrusively in the background. And then there's that horribly distracting blue light that flashes whenever the drive mechanism is active. This annoyance is akin to having a banner ad sitting on your desktop.

Iomega says the Peerless disks can withstand drops from up to 30 inches, and, indeed, after a tumble onto the linoleum from that height—oops!—our drive remained intact and our data remained safe. Still, the one-year warranty on the base station and disks warns you to handle them with extreme care.

We managed to get a steady 1MB/sec throughput on our USB model in direct file transfers between the Peerless and its host PC. But when applications called on the Peerless to retrieve files, speeds dropped to approximately 800KB/sec. When we plugged in a USB Zip drive and transferred files from both devices simultaneously, an ugly tug-of-war lowered transfer rates to an average of 400KB/sec for the Peerless. By the time this issue hits the stands, a FireWire module will be available for the Peerless, which would be far more in keeping with the on-the-go image the Peerless is attempting to project—previous testing we've done on FireWire hard drives has yielded transfer rates ranging from 11MB/sec to 15MB/sec.

Iomega bundles MGI *PhotoSuite* and *VideoWave* with the Peerless Drive System to highlight the unit's multimedia applications. Also bundled is Altris *PC Transplant Pro*, which lets users gather and compress all their Windows system settings and files into a "personality package" that can be downloaded to the Peerless drive and uploaded to any other PC.

The Peerless Drive System, while undoubtedly a useful product, banks its high price on a cloudy vision of portability. There are already better options for portable storage, such as Buslink's stackable USB drive or LaCie's elegant Pocket Drive. Despite Iomega's strong presence in removable-media products, we still think the Peerless Drive System is a risky investment.

—LOGAN DECKER

MAXIMUMPC VERDICT

10GB Peerless Drive System
IOMEGA

+ WHAT WE LIKE

The disks are sturdy and lightweight, and with *PC Transplant*, the Peerless offers portability possibilities for users with cash to burn.

– WHAT WE HATE

At least two base stations are necessary to get true portability from the Peerless, which puts the price in the stratosphere for a mere 20GBs of storage.

888.446.6342 www.iomega.com
$360 (includes 10GB disk)

4

Copyrighted Material

GeForce3 Deadlock

Virtually identical videocards barely trade blows in non-battle of the century

The Hercules 3D Prophet III is like every other GeForce3 board available—but comes with a DVI connector.

Back in the early days of 3D-gaming accelerators, many competing videocards sported the exact same 3D chipset. Shoot, the original TNT chipset from nVidia appeared in cards from STB, Hercules, Diamond, Creative, Canopus, and Guillemot (and that's just what we could remember off the top of our heads). Nonetheless, the vendors still managed to differentiate their boards with unique features. For example, Canopus eliminated the vexing external pass-through cable for its Voodoo boards, Wicked added 3D shutter glasses, and Hercules clocked its boards beyond the recommended limits for maximum performance.

RAW DATA

	Hercules 3D Prophet III	Elsa Gladiac 920	VisionTek GeForce3
Quake III MPC	52.1fps	52.6fps	51.0fps
3DMark2001 Game 2	34.4fps	34.5fps	34.5fps
3DMark2001 Game 4	15.3fps	15.3fps	14.2fps
Aquamark	24.0fps	24.0fps	23.0fps

NOTE: *All tests were run with V-sync disabled at 1280x1024 in 32-bit color on our HP 1.3GHz Pentium 4 test systems. The custom Maximum PC Quake III timedemo is available on the Maximum CD, which comes with newsstand copies of this magazine. If you subscribe and want the disc, go to* ***www.imaginemedia.com*** *and click Customer Service. No videocards were harmed during the making of this review, although Will did cut his finger.*

But times have changed. Today's videocard reference designs call for memory that runs at the limit of current silicon technology. There's very little wiggle room to overclock today's videocards, and there's certainly no faster memory widely available than the 230MHz DDR soldered onto GeForce3 boards.

So guess what? All the GeForce3-based boards we've ever reviewed perform almost identically in all benchmarks. The circuit board designs themselves are also virtually identical. So how can we differentiate between boards? Has the software bundle—usually chockfull of games that no one ever plays—suddenly become relevant? That's highly unlikely. Anyone who spends $400 on a videocard should already have all the games that might ultimately find their way into a software bundle. What about drivers? Well, the drivers included in GeForce3 boxes are just the latest nVidia reference drivers, with updated logos and a gimmicky add-on or two.

The Gladiac is another great card, but there's nothing to distinguish it from all the other GeForce3 competitors—except it doesn't come with a DVI connector.

Fortunately for consumers, GeForce3 cards provide similar kick-ass frame rates and are as feature-complete as any other gaming boards available. Both of the cards reviewed here include 200MHz GeForce3 cores, with 230MHz DDR SDRAM. Additionally, both cards come with standard VGA and S-video outputs. Next we'll break down the differences, what there are of them.

HERCULES 3D PROPHET III

The Hercules 3D Prophet III includes a DVI port for flat-panel support. Also, it's purple and has a round heatsink. For movie-watchin' lovin', the Prophet III includes *PowerDVD* software, which produces a sharp image with good color reproduction.

ELSA GLADIAC 920

The Gladiac 920 is a slightly different card from the Prophet III. You see, it's green, has a square heatsink fan, and doesn't include the nubbin-esque DVI connector. There are a few minor additions to the standard nVidia reference drivers, such as Elsa's monitor database, which includes monitor setup information for most common CRT-based monitors. Elsa also chose to bundle its homegrown DVD software, *Elsa MoviePlayer*, which serves up DVD playback when called upon.

We were initially excited when we heard that Elsa bundles an exclusive DirectX 8 version of *Giants*, but when we sat down to play it, we couldn't see any real difference between the standard version and the enhanced version. As an added bonus, the Gladiac comes bundled with a nifty mouse pad similar to the 3M Precise Mousing surface.

THE UPSHOT

The cards on this page represent nothing less than the culmination of a decade's worth of 3D hardware development. But this peak is really just the beginning. While the spectacular effects enabled by programmable shaders are astounding by today's standards, graphics processors will only continue to get faster, which will in turn allow developers to create more and more astounding effects. Ultimately, we will see photo-realistic gaming in realtime on PCs. Do either of these cards do that? No. But the day is coming soon.

Which of these cards should you buy? Unless you want DVI-output or a new mousepad, it doesn't matter. The Gladiac is blue, the Prophet III is purple. That's the biggest difference between the two.

—WILL SMITH

MAXIMUMPC VERDICT

Gladiac 920
ELSA

WHAT WE LIKE
The Gladiac is a GeForce3. Included is the DirectX 8 version of *Giants*.

WHAT WE HATE
The DirectX 8 version of *Giants* looks exactly like the DirectX 7 version of *Giants*.

800.272.3572 www.elsa.com
$400
10

MAXIMUMPC VERDICT

3D Prophet III
HERCULES

WHAT WE LIKE
It's a GeForce3. This board, like its brethren, is the very fastest 3D accelerator available to man.

WHAT WE HATE
It's just like all the other GeForce3 boards.

877.484.5536 http://us.hercules.com
$430
10

Copyrighted material

The A/V Squad

MP3 players, digital PC speakers, and a bright idea from DayGlo

DayGlo InkJet Cartridge

Printers rank among the dullest of PC peripherals—so the idea of adding a little fun to our inkjets with Day-Glo ink cartridges had us dreaming of tangerine trees and marmalade skies. Or even print-outs of MapQuest driving directions with fluorescent green trim. The DayGlo colors come in cartridges for Apple, Canon, Epson, Hewlett-Packard, and Lexmark inkjet printers, and they install just like standard color-ink cartridges. DayGlo also offers black cartridges—but what's the fun in that?

WHAT WE LIKE: Just snap it in, and your printer's none the wiser that there's a cartridge of DayGlo color waiting to unleash greater-than-Technicolor brilliance on your color documents.

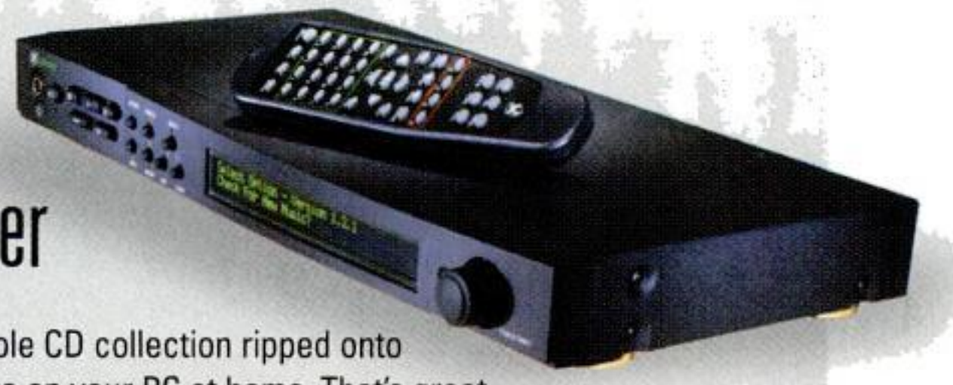
WHAT WE HATE: We couldn't even get close to Technicolor on heavily colored maps or web pages—much less the ultrabright hues of DayGlo green, orange, and pink. Only yellow print-outs gave us high-voltage color.

—ROB PRATT

MAXIMUM PC VERDICT: 3

up to $30 (depending on printer), DayGlo Color Corp., www.dayglo.com, 877.632.9456

Gateway Connected Music Player



You've got your whole CD collection ripped onto a massive hard drive on your PC at home. That's great for loading music into the portable MP3 player you take to the gym, **or for** getting into a groove while you're sitting in front of your PC. But this **storage** method doesn't do you any good if you want to blast MP3s from speakers located on the other side of your house. Gateway's Connected Music Player hooks **your** living-room stereo to the MP3 collection on your PC via a home Ethernet or phoneline network (a HomePNA PCI card comes **with** the player). **The** sturdy, black case blends in with other home-stereo components—as does the unit's excellent audio quality.

WHAT WE LIKE: No client application is necessary. The Gateway Connected Music Player finds all MP3s and playlists in shared folders **on** connected PCs.

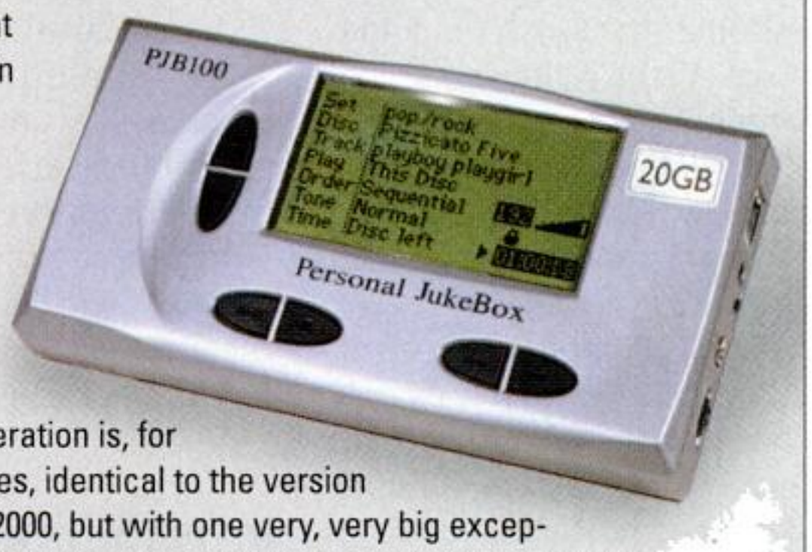
WHAT WE HATE: The player doesn't pre-buffer **MP3 files, which means** you'll suffer a two-second gap of silence between tracks.

—ROB PRATT

MAXIMUM PC VERDICT: 9

$300, Gateway, www.gateway.com, 800.846.4208

RemoteSolutions Personal Jukebox



It's hard to believe that some MP3 players can already be referred to as "classics." But as one of the first hard-drive players we ever tested, RemoteSolutions' Personal Jukebox qualifies. The latest iteration is, for all intents and purposes, identical to the version we reviewed in April 2000, but with one very, very big exception: The Personal Jukebox's capacity has been upped from 6GB to a stupendous 20GB.

WHAT WE LIKE: Drive-letter recognition makes for drag-and-drop loading and unloading, the LCD is incredibly easy to read, and 20GB is enough space to hold the MP3 collections of the *entire* magazine staff.

WHAT WE HATE: The Personal Jukebox is still fettered by the delicate traits inherent to a hard-drive player—we wouldn't, for example, take **it** on the StairMaster. It's a bit on the large side, formfactor-wise. And **if** only it weren't so damn expensive...

—KRISTEN SALVATORE

MAXIMUM PC VERDICT: 8

$595, RemoteSolutions, www.pjbox.com, 866.736.6837

Polk Audio AMR150

Polk Audio is well-known among home stereo, home theater, and car stereo enthusiasts for speakers that consistently deliver both purity and power, so it's no surprise the high-end AMR150 digital PC speakers have a flat frequency response. Viewed from the front, the speakers' tall, cloth-covered grilles make them look like flat-panel speakers—but they're not. The pregnant bulge on the back cover hides a magnetically shielded midrange and a polycarbonate dome tweeter. Polk Audio calls the AMR150s "digital surround" speakers, but that doesn't have anything to do with Dolby Digital Surround compatibility. It just means you can connect them to the 1/8-inch digital output from a soundcard.

WHAT WE LIKE: Flat frequency response and even volume across the whole audible spectrum gives the AMR150 speakers clear audio, whether playing classical music on audio CD or a booming car chase on DVD.

WHAT WE HATE: These speakers have little in the way of guts—they lack low-mid punch and high-end definition (for example, vocals and guitar solos just don't pop out at you).

—ROB PRATT

MAXIMUM PC VERDICT: 6

$170, Polk Audio, www.polkaudio.com, 800.377.7655

Copyrighted Material

SimpliCD

CD-burning essentials get wired into Windows

What happens when a Hot Wheels car collides with a rotary phone? You get *SimpliCD*'s stylish player and recorder interface.

Developed by the company that supplies controller hardware for the majority of all optical drives, *SimpliCD* takes a fresh approach to CD mastering and burning: The software integrates directly into your Windows interface, saving you the trouble of launching a full-fledged application or enduring tedious animated wizards just to burn a disc. Power users, however, may find that *SimpliCD* isn't filled with enough features to take the place of the burning apps that come bundled with their drives.

Like waiters who introduce themselves by name, most CD-burning applications confuse chumminess with good service. Creepy anthropomorphic icons and scores of cumbersome wizards mask the fact that these applications force you to adapt to the arcane standards of multiple CD formats. *SimpliCD*, on the other hand, provides a true interface by building on the already familiar file-management features found in Windows. You can handle data CD-Rs and CD-RWs in much the same way as any other type of removable media—files intended for burning to disc can be dropped onto the *SimpliCD* icon on the desktop, dragged from within Explorer, or right-clicked and transferred via a Send To menu item. When it's time to burn, just right-click the folder or use the file menu to select Burn Disc. This efficient, minimalist ethic applies to every aspect of *SimpliCD*. For example, inserting a blank CD spurs a modest, unadorned menu of choices to pop up in the system tray area, not in the middle of the screen—and not accompanied by an animated mariachi band and exploding piñatas.

What's the sound of one hand burning? A simple click—that's all it takes with *SimpliCD*.

SimpliCD takes the same no-bull approach to audio ripping and conversion. Right-click an audio CD in My Computer, and the *SimpliCD* recorder (which handles audio- and video-burning tasks) rips the tracks, grabs their names from CDDB, inserts editable ID3 tags, and then stashes the files in the folder of your choice. All this action takes place with a few mouse clicks and without confusing selections or gratuitous dialog boxes. The recorder also supports MP3 and WMA file conversion with custom bit rates up to 320Kbps.

Though *SimpliCD* emphasizes ease-of-use and compatibility, it's not exactly spartan when it comes to features. With the same snappy drag-and-drop attitude, the recorder also creates video and slide-show CDs that play in set-top DVD players. It automatically converts audio CDs to CD-text files for electronic devices capable of displaying track information. *SimpliCD* is also the first application to support the newly minted CD-CA standard, which provides a protocol for stand-alone CD players to play MP3 CDs by artist, album, genre, or playlist. (These devices aren't expected to appear until the latter half of 2001—and even then, we'll believe it when we see it.)

We merrily burned seven discs using all the supported formats, and we only encountered problems with *SimpliCD*'s extremely finicky MPEG-1 file requirements for Video CD, an awkward quirk designed to ensure maximum compatibility with set-top DVD players. Compatibility across consumer electronics is also the reason why overburning, to our dismay, is only supported for data CDs.

We wouldn't be disappointed to get *SimpliCD* bundled with our drives, but Oak Technology is quixotically pushing *SimpliCD* for upgraders, a market that generally craves more advanced features, not fewer. *SimpliCD*'s tight integration with Windows, and its efforts to bridge the gap between PCs and consumer electronics are ideal for casual users. But most CD-burning enthusiasts have become accustomed to the software bells and whistles bundled with their drives, such as *EZ CD Creator*'s voluminous software suite or *Nero*'s sophisticated audio-track filtering. For them, *SimpliCD*, for all its elegance, may feel like a downgrade.

—LOGAN DECKER

MAXIMUMPC VERDICT

SimpliCD
OAK TECHNOLOGY

WHAT WE LIKE

A sleek, minimalist interface and tight integration with Windows makes CD burning almost automatic.

WHAT WE HATE

SimpliCD should accommodate power users with better control of audio track layouts and support for burning mixed-mode CDs.

408.737.0888 | www.oaktech.com
$50 download
$65 physical shipment

7

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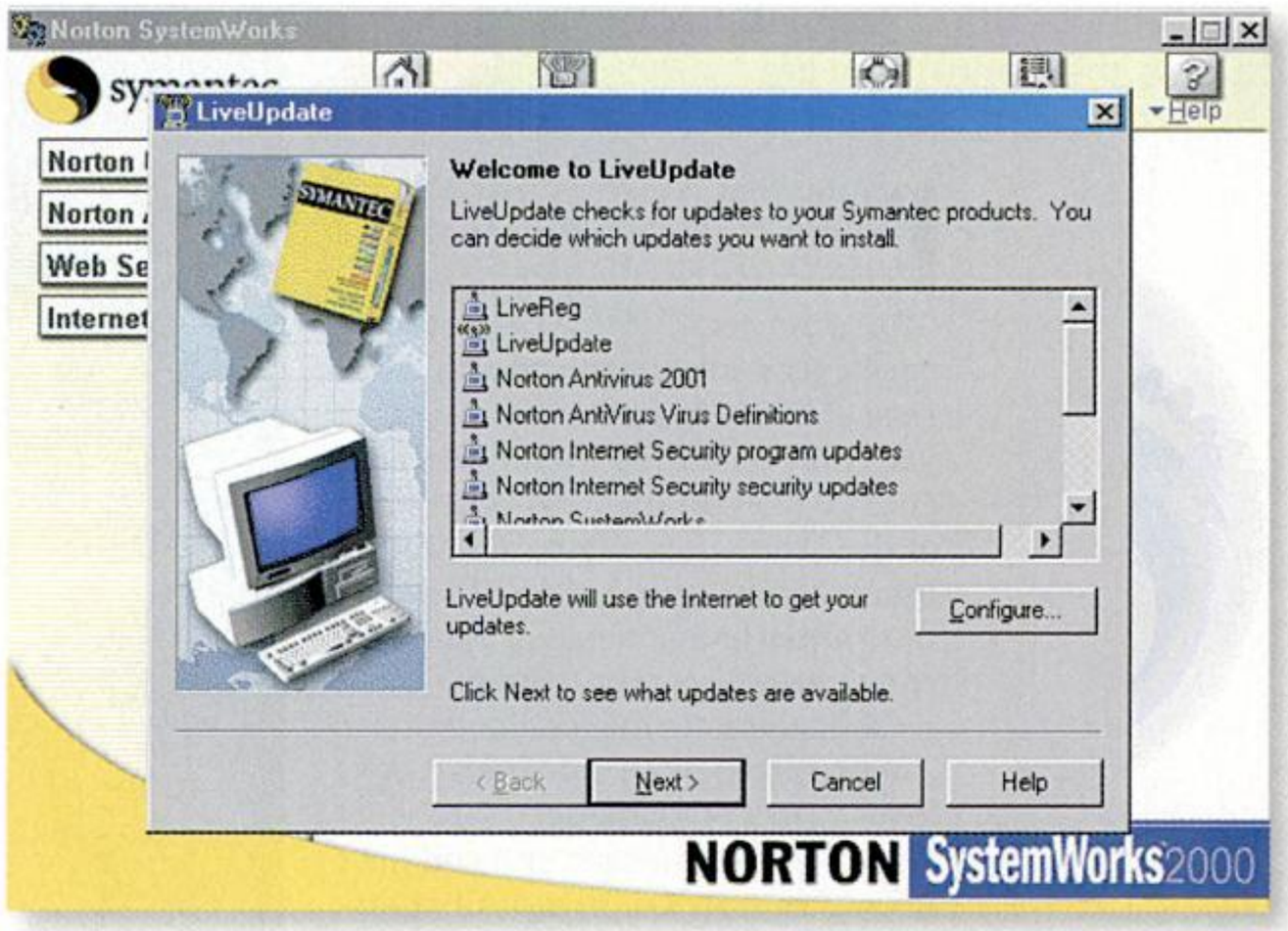
Norton Internet Security 2001

Firewall walk with me



As with all the other *Norton* PC-protection apps, *Norton Internet Security 2001* is easy to configure and can be updated with only a few mouse clicks.

The latest edition of *Norton Internet Security* from Symantec helps you fight back against sick, freaky Internet sneaks. You know the type. They steal your files, peak at your (ahem) boudoir photos, and, worst of all, pilfer your credit card numbers and financial information. Packed with useful tools—such as the superlative *Norton Antivirus* software, a useful and effective firewall, a plethora of privacy controls, and an Internet ad blocker—*Internet Security* comes bundled with just about everything a security-minded Internet user needs.

Installation is a breeze. The software configures everything itself or lets you configure settings manually. If you own *Norton Systemworks*, *Internet Security* integrates with it completely, creating a new icon on the taskbar that launches everything from *Firewall* to *Clean Sweep*.

A hefty manual explains how everything works, but the best thing about *Internet Security* is that you don't even have to be aware that it's working. For example, *Antivirus* automatically scans documents, incoming e-mail, and anything else trying to get into your PC, and it only calls on you when there's a problem. Privacy controls let you decide which programs can connect to the net. For example, *Newsreader*, *ICQ*, and *Weatherbug* need permission rights before they can function. Fortunately, you can check a box to permanently give transmission rights to frequently used Internet clients.

On the other hand, it's a hassle to constantly give *Internet Security* permission to load random web sites during regular-old web surfing. On web site redirects, you often have to give permission to both the original site and the destination site. Sending secure documents requires permission each time, and receiving these permission requests is akin to having a nagging voice in your PC continually asking, "Are you *sure* you want to do that?" If you're always certain of what you're doing on the Internet, the security alerts are bound to become annoying very quickly.

Norton Internet Security
Internet Access Control
Tell me more
News Engine Update Application is attempting to access the Internet.
Threat Level Low Risk (Details>>)
What do you want to do?
Permit this application to access the Internet
Block this application from accessing the Internet
Customize Internet access for this application
OK
Always use this action for this application.

Internet Security alerts you when apps try to relay your information to HQ, then lets you decide if the tell-all app gets to make the call.

Some of *Internet Security*'s warnings are quite useful, however. When you download programs (be they malicious spyware or common applications with aggressive marketing tactics) that try to send information back to headquarters, *Internet Security* stops them cold and lets you decide whether the program makes that call. You can also configure *Internet Security* to block Active X controls, snoopers, hackers, and Java applets. With the click of a box, you can control which cookies your browser accepts, or you can block them altogether. You can also selectively block banner and pop-up advertising. Some web pages and web servers won't grant you access with this feature turned on, but, in general, you won't have to wait for ads to load, and that'll speed up your browsing considerably.

Internet Security joins the *Norton Utilities* taskbar group (or creates one if you don't have *Utilities*) and then runs quietly in the background. Though it's always running, you're almost never aware of it unless you click the status button. On our test systems, *Internet Security* never slowed down performance or startup. Still, it found an alarming number of potential security pitfalls. After just a few hours of use, the utility reported that it had blocked more than 1,000 attempts to tap into our Internet-connected PC. (Note: These likely weren't malicious hackers, but normal day-to-day, computer-to-computer queries.) It also stopped 45 ads during a typical web-browsing situation.

Add to all this one of the best and most up-to-date antivirus products available, and *Internet Security 2001* becomes a product that's easy to recommend. But for users already running *Norton Antivirus*, *Internet Security* doesn't offer a lot more protection than you've already got. Add *Norton Personal Firewall* instead, and you'll get as much protection for a less costly upgrade.

—ANDREW S. BUB

MAXIMUMPC VERDICT

Norton Internet Security 2001
SYMANTEC

WHAT WE LIKE

Solid protection from Internet threats comes with an easy-to-use interface. The ad-blocking feature really speeds up web browsing on slow connections.

WHAT WE HATE

The program starts to sound like a nagging grade-school teacher by continually asking, "Do you *really* want to do that?"

800.441.7234 | www.symantec.com
$70
7

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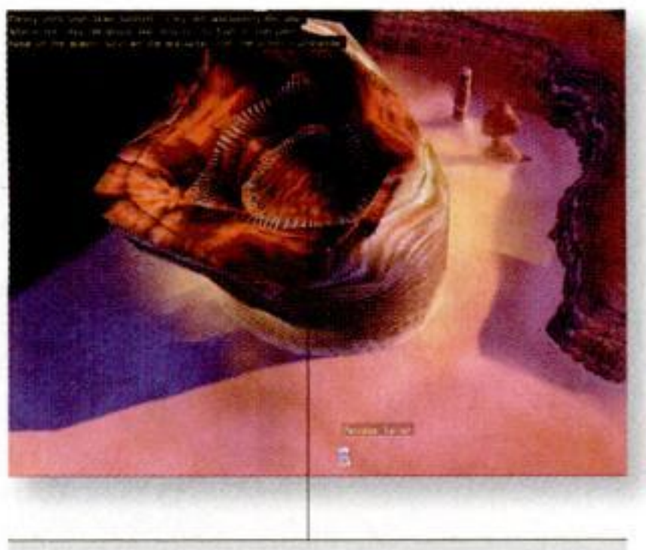
Emperor: The Battle for Dune

The founder of realtime strategy returns to give the genre new life

Even on the slowest speed, battles tend to be swift, complex, and deadly.

I know what you're thinking about *Emperor: The Battle for Dune*. Westwood Studios invented the realtime strategy (RTS) genre with 1992's *Dune 2*, then it ran the genre into the ground with 1998's *Dune 2000*. Why bother with another variation on a tired theme? Because *Emperor* rules. In the third installment of the *Dune* series, Westwood Studios triumphs over several of the RTS genre's most severe limitations and restores the crown to a PC gaming dynasty.

Campaigns are the lifeblood of RTS games. All too often, however, they're just a series of challenges thrown at you, one after another, and you have no say in how to surmount them. Usually, you're charged with finishing 10 to 30 missions, played as one of two warring sides. Once you're done with them, the game is history. *Emperor*, by contrast, offers approximately 50 missions per side. And you can choose to play one of three sides, each with unique units: House Atreides, Ordos, or Harkonnen. You select from a variety of missions with differing objectives. Because the storyline changes with your choice of missions, you don't necessarily play all the missions available in any campaign. You can win in as few as 13 missions, or take up to 30 to reach your final goal. There are also another 50 quest missions, involving five "sub-houses," that aren't central to the plot, but can bring substantial rewards. If you perform optional missions assisting the Fremen, for example, they may ally with you, which means you can lead more troops into battle. You can gain up to two out of five of these sub-houses as permanent allies.



Feed me! If you think the sandworm in the tutorial is fearsome, just imagine its breath after a well-spiced dinner.

The artificial intelligence in *Emperor* has a high level of strategic savvy, and that means the game scores high in replayability. Most RTS games treat missions as scripted affairs where enemies always act in the same way no matter how often you play against them. In *Emperor*, the majority of the missions are free-form. The computer opponent faces the same battlefield uncertainties that you do, and it pursues a simple overall objective—your destruction. Depending upon where and when enemy scouts sense your activity, the computer's artificial intelligence chooses to build units, fortify choke points, lure you into an ambush, or launch an all-out assault.

While other RTS games cloak threadbare gameplay in a lot of activities that require monitoring, *Emperor* keeps resource gathering and tracking, production charts, and technology research to the barest minimum. There's only one resource, the spice melange, and even that's harvested by automated equipment. Research offers only simple upgrades to a few buildings. There are no charts to study, and you only have to keep track of a dozen units per side and a dozen buildings in all. While many RTS games provide complex interfaces with steep learning curves, *Emperor*'s game screens are easy to use. The game's thorough tutorial is superfluous since you can quickly figure out how to play the game on your own. You'll have to be careful about speed settings, however. If you run *Emperor* on a fast computer, the pace can get out of control—sometimes even too fast to make decisions about missions and the direction of your campaign.

Emperor's 3D engine is more than just a pretty face, but you do get plenty of eye candy. Deformed terrain has a strategic purpose in creating height advantages on the battlefield. Mechanized units must plan their movements to avoid impassable zones. Rotate and zoom controls mean that you don't have to command battle from a fixed viewpoint. Atmospheric effects, such as particle-spewing afterburners on carryall units and shape-shifting shadows, are first rate.

All of the gameplay elements in *Emperor* are familiar to any fan of RTS games. Other games have tarnished the RTS genre with linear campaigns, embarrassingly poor enemy artificial intelligence, and fussy make-work with resources and production. With polish and a precise focus on gameplay, *Emperor: Battle for Dune* puts energy back into a tired genre.

—BARRY BRENESAL

MAXIMUMPC VERDICT

Emperor: Battle for Dune
WESTWOOD STUDIOS

WHAT WE LIKE

Great graphics, high replayability, strong enemy artificial intelligence and an easy-to-use interface restores the crown to an RTS gaming dynasty.

WHAT WE HATE

The speed control cranks up the pace too much on fast computers.

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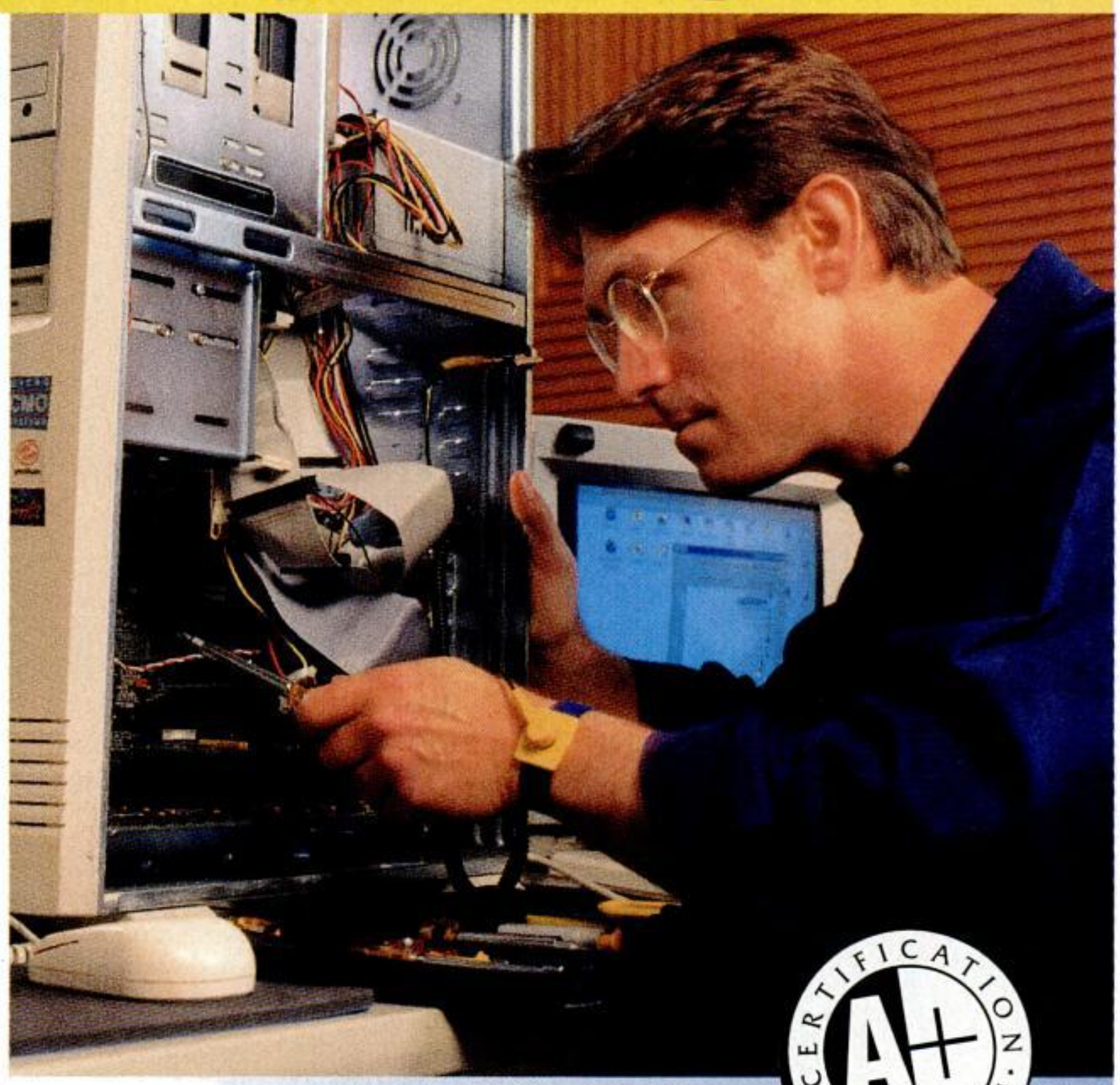

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Atlantis: The Lost Empire

If only it had stayed lost

We hope the monsters in the movie look better than this.

Movie tie-in games don't *need* to be bad. For instance, there is... Well, there is...

Okay, so they *do* need to be bad. It's an unwritten rule. Perhaps it's even written in some little corner of an SDK manual: "When developing a game based on a movie, always make it suck." The folks at Zombie have certainly taken such advice to heart in giving us *Atlantis: The Lost Empire*, a game with so little to warrant a recommendation that even the page spent smacking it silly seems like a waste, except as a warning.

The first clue that you're in for a slapdash experience comes from the Lithtech logo on the box. With the notable exception of *No One Lives Forever*, Lithtech is the engine of choice for cheap, quick games. It says to the customer, "This game wasn't worth the effort of paying for *Quake* or *Unreal*." In the right hands, Lithtech can be a competent, if not great, engine. With *Atlantis*, it's a little harder to gauge its abilities because the game deliberately affects a cartoon-like visual style to emulate the movie. Textures are flat, bland, and lifeless, while environments are simplistic and uninspired. The abysmal white-out effects used for snow and smoke reveal Lith's failings at translucency, while heavy use of fogging betrays its inability to do distance rendering. Both of these failings are to the game's detriment, adding visual confusion to an already muddled experience.

That experience is terse, to say the least. For no apparent reason, the game is broken into two sections: "Search for the Journal" and "Trial by Fire." The former offers three blink-and-you-miss-them levels that manage to account for 15 minutes of game time only because rotten control and perspective force you to replay one level about 10 times to get it just right. This episode is supposed to be some kind of introduction leading into "Trail by Fire," which one would assume is the long game.

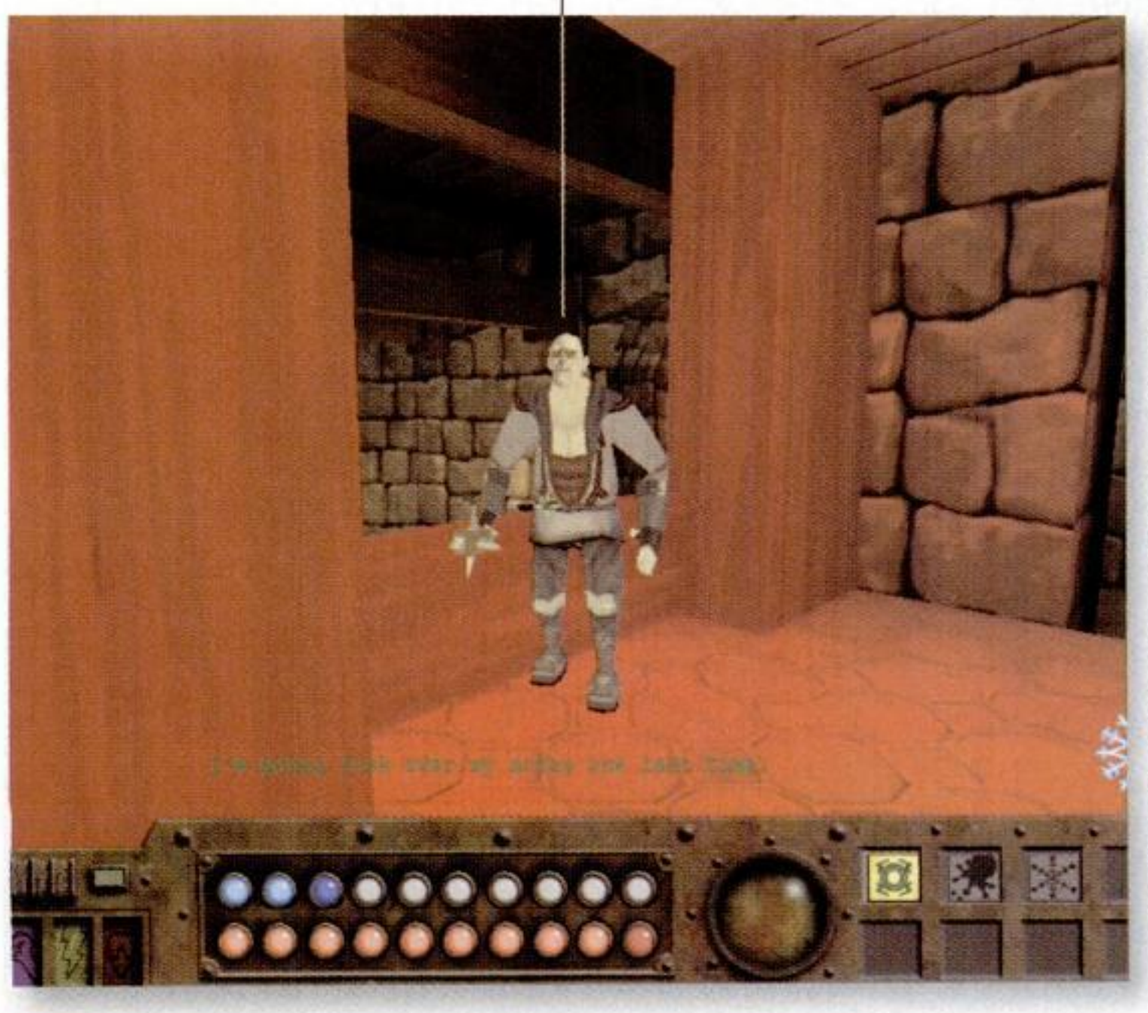
One would be wrong. "Trail by Fire" does have 18 or so micro-levels, but even the younger gamers this title is geared for will be hard-pressed to squeeze more than an hour and a half out of it. Each level takes just a few minutes to navigate. Some places, such as the caves, take a little longer, thanks to an appalling layout and complete darkness. (Nothing gooses playtime better than stumbling around in the dark.)

The point of the game is cryptic in the extreme, demanding familiarity with the movie. We had no clue who the people talking to us were, or why we were doing what we were doing. Some rudimentary puzzle solving (bringing item A to location B) and lots of silly, child-friendly "combat" are the dominant gameplay elements. Control is a nightmare, with third-person flying and submarine sequences that rank among the very worst we've experienced. Creature models are amateurish, and the interface bar takes up too much of the screen. Five different weapons and tools are available, but their functions tend to be unclear and they are never visible onscreen. A few multiplayer modes are available, but good luck finding anyone to play against, even with the included GameSpy support.

Atlantis is the very definition of a lazy knock-off done merely to support the release of a motion picture. It serves no purpose but to help spread the *Atlantis* brand more liberally about the shelves, joining the toys, sheets, shirts, and Happy Meals. It's a lunchbox for the Electronics Boutique.

—THOMAS MCDONALD

Animal, vegetable, or mineral? This is... Actually, we don't know what it is, but it's a good example of the fine character models in *Atlantis*.



MAXIMUMPC VERDICT

Atlantis: The Lost Empire
DISNEY INTERACTIVE

WHAT WE LIKE

The scenes from the movie look nice.

WHAT WE HATE

Short game times, clumsy controls, and boring, terse levels.

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$25

1

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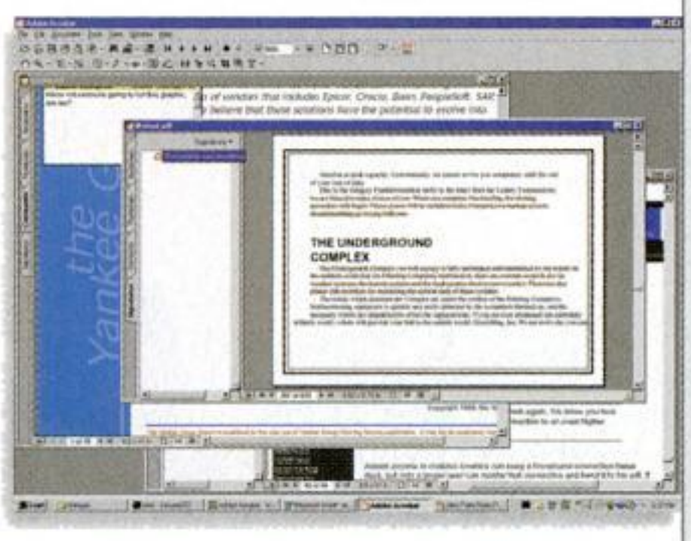
Software Shakedown

Two games. Two design apps. 'Nuff said

Acrobat 5.0



The days before PDF (portable document format) were dark indeed, littered with bland text files and bloated attempts to embed text and graphics in a universal document format. Adobe's PDF is now such a mature standard, however, that most of the new capabilities in *Acrobat 5.0* are strictly special-interest.

WHAT WE LIKE: *Acrobat 5.0* can automatically convert text and graphics from compiled PDFs to standard desktop formats. Adobe has finally caught up with the movement to 128-bit encryption. Design teams will love the collaboration, markup, and sign-off tools. The new PalmOS PDF reader (free separate download) and tags help improve the rendering of documents on tiny displays.

WHAT WE HATE: Adobe solved the universal-document problem back in *Acrobat 2.0*. Since then, the company's been more worried about content security issues, such as preventing clipping and printing, than making a better document format.

—JASON COMPTON

MAXIMUM PC VERDICT: 8

$250, Adobe, www.adobe.com, 888.724.4508

Half-Life: Blue Shift

Half-Life is over three years old, and the *Opposing Force* expansion pack is over a year and a half old. But the game is *still* one of the most popular on the net (thanks to the *Counter-Strike* mod). *Blue Shift* includes the full *Opposing Force* add-on (there's a rebate for owners of the previous *Opposing Force* edition), new graphics, and a fun little episode featuring security guard Barney Calhoun. It's nice, but is it worth the money? All things said and done, we'd much rather have *Half-Life 2*, thank you very much.

WHAT WE LIKE: The same excellent pacing, mood, and artificial intelligence of the previous games. Though old, *Half-Life* is still very cool, and a new *Half-Life* episode is a welcome treat for fans.

WHAT WE HATE: The price is too high for what you get, the graphics engine is too old to compete with modern shooters, and the new episode contains no new monsters or weapons whatsoever.

—ANDREW S. BUB

MAXIMUM PC VERDICT: 5

$29, Sierra Studios, www.sierra.com, 877.446.0184

Offroad Redneck Racing

Racing games sometimes need a little attitude to appeal to non-motorsports fans. Can *Offroad Redneck Racing* muster enough monster-truck madness to do the trick? It comes packed with 16 highly detailed tracks and 16 different scenes, which makes for more combinations than you can master in a week of playing. The multiplayer mode comes ready to drive traffic through your LAN, but there won't be many road rage incidents since only six players can compete at a time.

WHAT WE LIKE: The levels are beautifully decorated and nicely complement the crazy monster trucks. The soundtrack is full of pumping beats, and it sounds great even when you're flipping upside down and crashing into rocks.

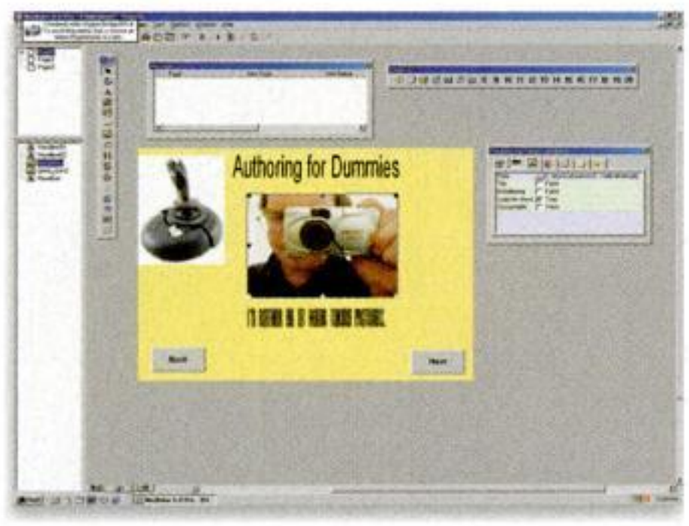
WHAT WE HATE: It's lots of fun for young gamers. Look elsewhere if you're into more subtlety in PC games.

—TUAN NGUYEN

MAXIMUM PC VERDICT: 6

$19, Interplay Interactive, www.interplay.com, 949.553.6678

Mediator 6 Pro



Multimedia authoring for the web or CD-ROM has become a serious and complex business, complete with dense scripting languages such as Macromedia's Lingo. With *Mediator 6 Pro*, you don't need to attend night-school classes just to build your own multimedia content. The program isn't as intuitive for the novice as it purports to be, but it's a full-featured package for the price and supports typical formats, such as animated GIFs, as well as advanced tools, such as dynamic HTML.

WHAT WE LIKE: For the budget-conscious looking for a quick multimedia fix, *Mediator 6 Pro* offers a stable short-term solution and plenty of templates for multimedia authoring neophytes.

WHAT WE HATE: The quirky interface has endless fields laid out in vertical rows. And the export format is incompatible with other multimedia authoring applications.

—EDWARD CHAMPION

MAXIMUM PC VERDICT: 6

$400, Matchware, www.matchware.net, 949.727.0450

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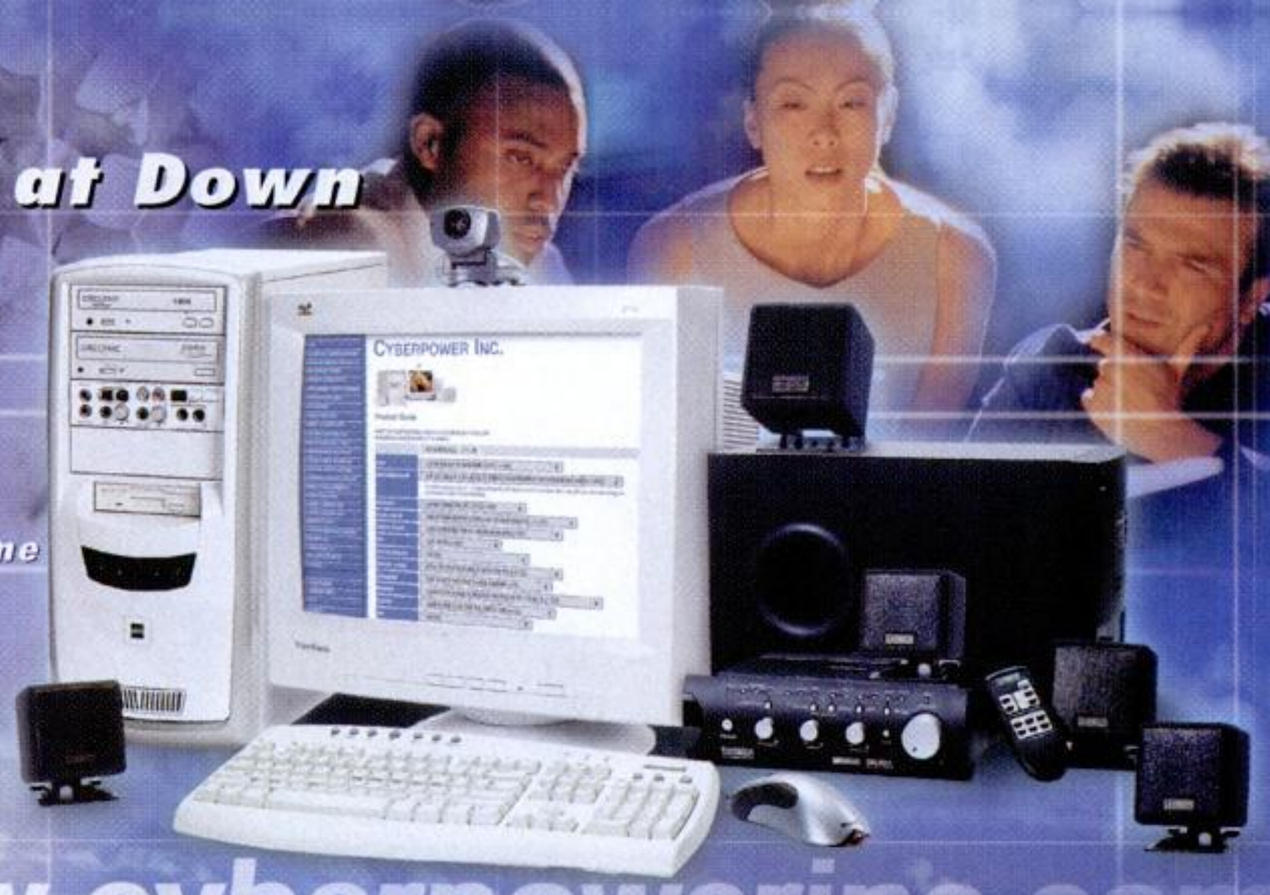

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Intel Pentium IV 1700	S 1925	M8012
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Intel Pentium IV 1400	S 1749	M8014
Intel Pentium IV 1300	S 1725	M8015

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- ZOOM 56K V.90 Fax Modem
- Mitsumi 1.44 MB Floppy Drive
- PS2 Win98 Multimedia Keyboard
- PS 2 Internet Mouse w/ Wheel
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AMD ATHLON 1.33GHZ	S 1069	MK802
AMD ATHLON 1.2GHZ	S 1029	MK803
AMD ATHLON 1.13GHZ	S 1025	MK804
AMD ATHLON 1.0GHZ	S 1019	MK805
AMD ATHLON 900	S 999	MK806

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Intel Pentium IV 1500	S 1149	M8022
Intel Pentium IV 1400	S 1075	M8023
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AMD ATHLON 1.0GHZ	S 929	MA705
AMD ATHLON 900	S 909	MA706
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Intel Pentium III 1000	S 659	M8031
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Intel Pentium III 850	S 619	M8034
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Intel Pentium III 1000	S 955	M8074
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Intel Pentium IV 1700	S 1143	MF802
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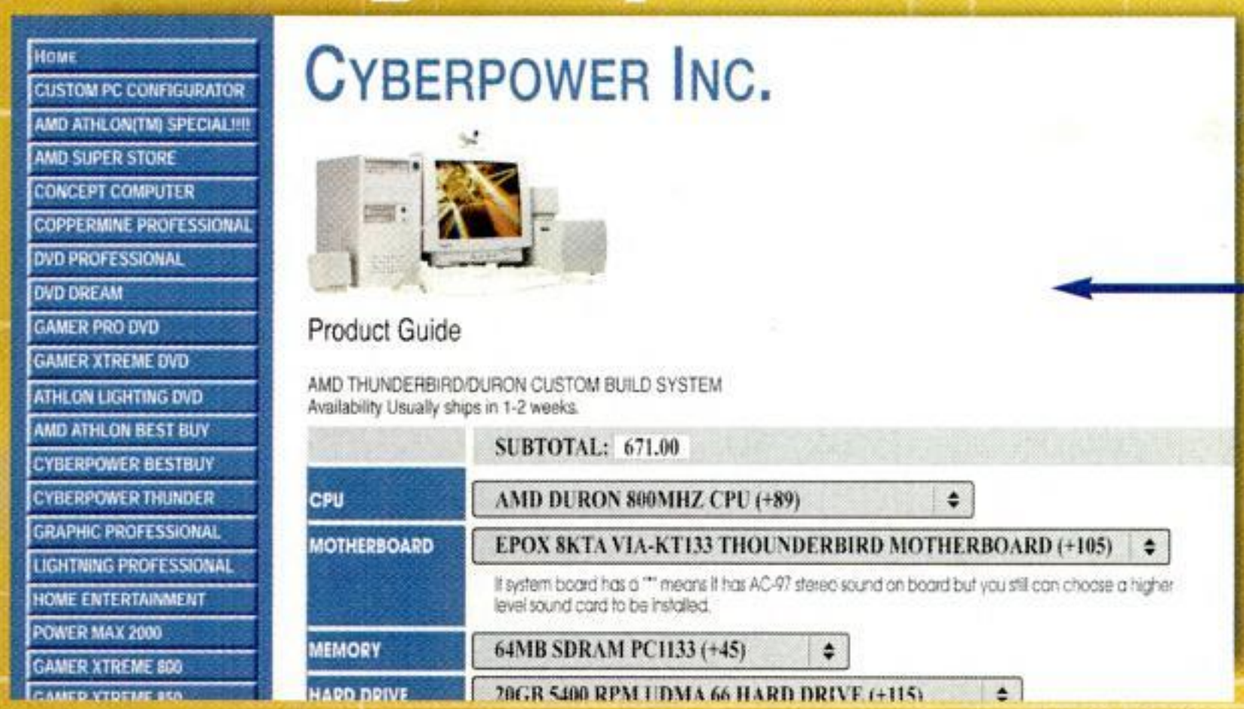

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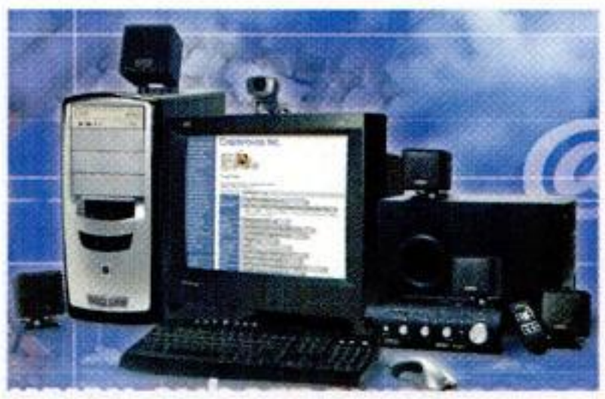

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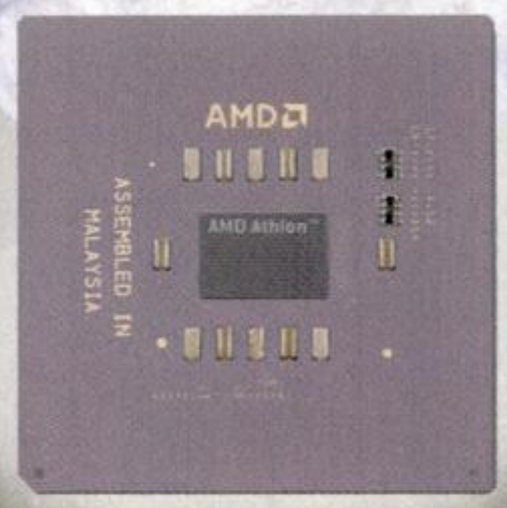

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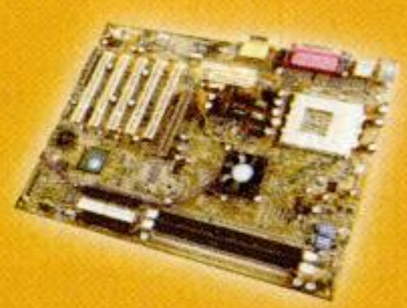

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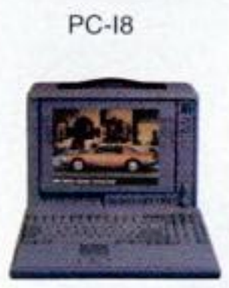
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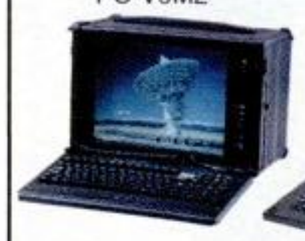
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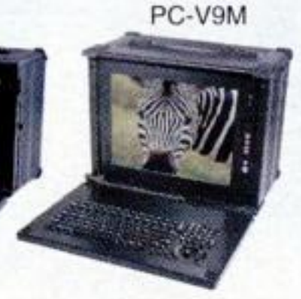
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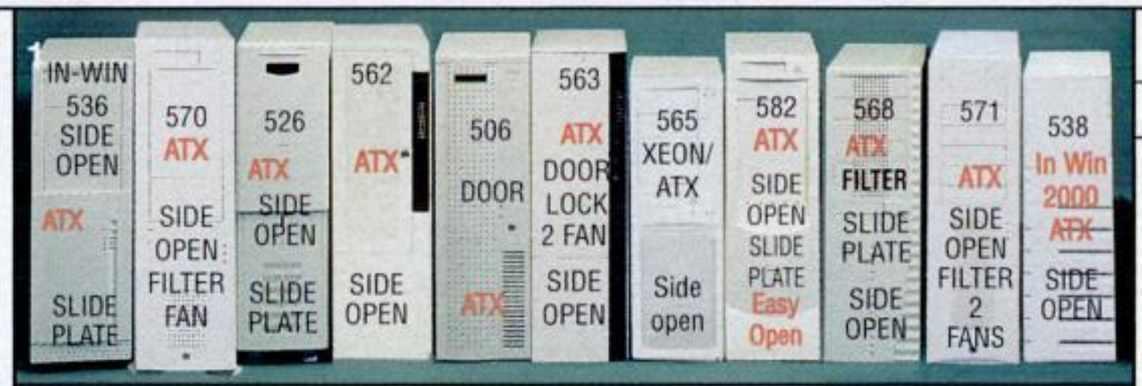
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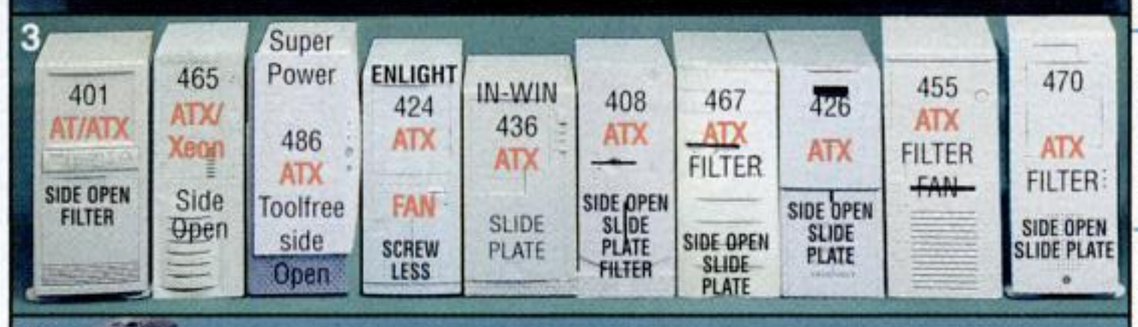
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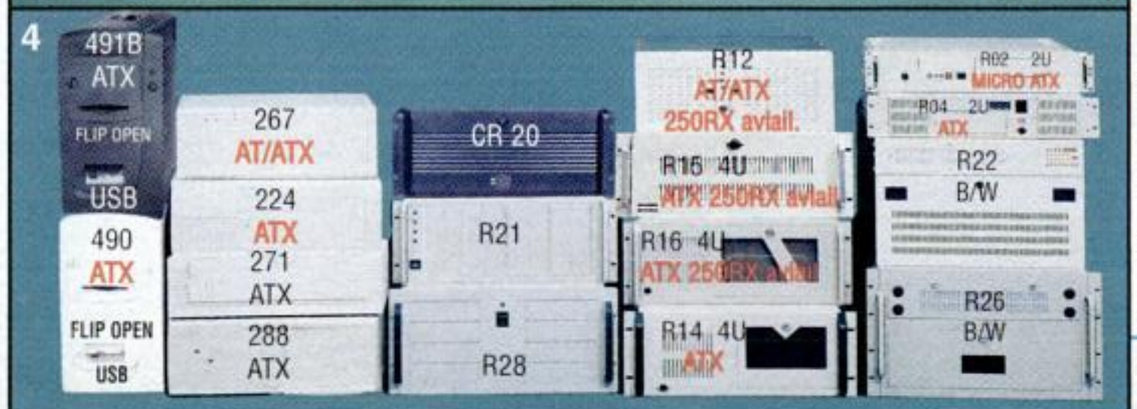
470 ATX FILTER SIDE OPEN SLIDE PLATE



MODEL/ SPECS	Bare Bone	Dimension W.D.H	I/O ports	5.25"	3.5"	PCI	PCI ISA
103LPX socket 370	330	12.4x14.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO, GAME	1	1/1	2/1 or 1	
104NLXBX slot 1	460	11.2x13.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME	w/FD & Slim CD		2/1 or 1	
105LPX socket 370	375	11.9x12.6x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME, IR	1	1/1	2	0
106 socket 7	260	12.4x14.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO, GAME	1	1/1	2 or 0	
108NLX socket 370	375	12.4x14.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME, IR	1	1/1	2 or 1	
192 370/II Micro ATX	220	12.1x16.5x3.5	PS2 KB, mouse, VGA,2S,1P,AUDIO	1	1/1	2 & 0	

Case Specification & Price List

Model	Price	Dimension W.D.H.	MB Size	5.25 Ext./Int.	3.5 Ext./Int.	P.S.
R02 BARE	300	19x17.6x3.5	M.ATX	1/0	1/1	150W
R04B/W	290	19x24.3x3.5	ATX	1/0	1/3	250W
R08 B/W	1675/2300	19x22x3.5				
R12 B/W	305	19x19.7x7	B/ATX	4/0	1/0	250W
R14 B/W	230	19x21x7	B/ATX	3/0	1/3	300W
R15	325/550	19x24.4x7	ATX	6/0	2/2	300W
R16 B/W	240	19x18x7	B/ATX	3/0	1/2	250W
R20 B/W	290	19x20.5x7		8/0		300W
R21 B/W	290	19x18x7		8/0		300W
R22R/B/W	635/950	19x23.3x10.5	ATX	8/0	1/0	300W/R
R26R/B/W	630/850	19x22.6x10.7	ATX	4/0	2/4	300W/R
R28	290	19x17x8.7		8/0		300W
RSP	18	5.8x9.3x1.6			1	
RSM169	65/75	5.8x9.3x1.6			1	
001B	75	10x11.5x3		1/0		60W
001B1	65	8.3x10.6x2.8		1/0		50W
002B	88	6.9x14.6x5.8		2/0		60W
002B1	78	7.5x11.2x6.5		2/0		80W
004B	105	6.8x15.3x9.3		4/0		230W
004B1	100	7.5x17.3x10.2		4/0		200W
007B	180	7x15.8x13		7/0		250W
008B	280	8.4x20.2x18.3		8/0		300W
008B1	180	7.5x17.9x17.1		8/0		250W
103LPX	330	12.4x14.5x3.4	LPX	1/0	1/1	85W
104NLX	460	12.4x14.5x3.4	NLX	1/0	1/1	85W
105LPX	375	11.9x12.6x3	LPX	1/0	1/1	90W
106LPX-7	260	12.4x14.5x3.4	LPX	1/0	1/1	85W
108NLX bare	375	11x13.6x3.4	NLX	1/0	1/1	135W
192M.ATX	85	13.1x16.5x3.5	M.ATX	1/0	1/1	150W
224	75	17.4x18.8x6.1	ATX	3/0	2/2	230W
267	75	16.8x16.8x6.2	ATX	2/0	2/1	250W
271	90	17.3x15.9x5.5	ATX	2/0	1/1	250XB
288	75	16.9x17x6	ATX	3/0	2/1	230W
325B	75	8x18.5x17	ATX	3/0	2/1	235W
327	72	7.5x16.5x17.3	ATX	3/0	2/2	230W
337	88	7.8x18.8x16.5	ATX	3/0	2/2	300W
338	55	7x14.7x13.8	M. ATX	2/0	2/1	145W
366	50	7.2x15.5x14.3	M. ATX	2/0	1/1	235W
367	55	7.7x16.5x17	ATX	3/0	2/1	235W
370	89	8.3x17.3x16.1	ATX	3/0	2/2	250WB
392	80	7.5x17x17	ATX	3/0	2/2	250W
393	95	9x17.5x17.5	ATX	6/0	1/1	250W
396	55	8.3x17x15.5	ATX	3/0	1/3	230W
401	110	8.5x17.3x18	ATX	2/0	2/2	250W
408	80	8.2x19.8x18.4	ATX	3/0	1/5	250W
411	62	7.2x17.2x16.8	ATX	4/0	2/1	250W
412	62	7.2x17.2x16.8	ATX	4/0	1/2	250W
413S/BL	62	8.5x19.5x18	ATX	4/0	2/1	250W
414P	62	7.2x20x16.8	ATX	4/0	2/1	250W
422	70	7.7x16.6x18.1	AT	4/0	1/4	250W
424	70	7.5x18.9x16.7	ATX	4/0	2/1	250W
426B/W/S	80	7.5x17.5x19.3	ATX	3/0	2/2	250W
436	70/85	8.6x18x15.6	ATX	3/0	2/2	250/300W
455	110	8.5x17.5x18.6	ATX	4/0	2/3	250W
465	195	9.3x17x17.2	XEON/ATX	2/0	2/2	300W
467	85/100	7.5x16.7x18.8	ATX	3/0	2/4	250W/300W
470	110	8.3x17.3x21.3	ATX	4/1	1/2	250WB
472	60	7.5x18x17.6	ATX	4/0	2/2	250W
482B	80	7.8x19.8x17.5	ATX	4/0	2/2	250W
486	67	9.6x19.5x17	ATX	4/0	2/1	250W
489**	85	7.3x17x17	ATX	3/0	1/2	235W
490	70	8.5x15.5x15	ATX	2/0	2/2	250W
491B	70	8.5x15.5x15	ATX	2/0	2/2	250W
496	60	8.25x17.8x16.5	ATX	4/0	1/3	250W
501	185	8.25x17.2x23.8	ATX	4/0	2/4	300W
503R/B	455	14.8x20.4x18.4	ATX	8/0	2/4	300RW
503/B	305	14.8x20.4x18.4	ATX	8/0	2/4	300W
505	510	14.6x23x26.8	ATX	12/0	1/8	300W
505R	705	14.6x23x26.8	ATX	12/0	1/8	300RW
506/R	155/370	7.8x16.5x24.4	ATX	6/0	2/2	300W/R
524	380	13.9x25.6x19.1	ATX	7/0	1/2	300RW
526B/W	105/120	7.5x17.5x24.5	ATX	6/0	1/4	250W/300W
528	95/110	7.5x16.5x24.8	ATX	6/0	1/5	250W/300W
536	93/108	7.8x17x24	ATX	5/0	1/5	250W/300W
538	290	8x20.5x24.5	ATX	5/0	1/6	300RW
555/B/R	440/680	11x19.3x23.6	F	4/8	0/0	400W/300R
555/R	440/700	11x19.3x23.6	ATX	4/8	0/0	300W/300R
560/R	290/445	15x24.5x23.5	ATX	11/0	2/4	300W/300R
562/R/B/W	250/470	8.7x17.9x26.8	ATX	9/1	1/0	300W/300R
563/RB/W	145/370	8.7x17.9x26.8	ATX	10/0		300W/300R
565	195	9.25x18.3x21.2	XEON/ATX	4/0	2/4	300W
568	105/120	7.5x17x22.8	ATX	5/0	2/4	250W/300W
569B/W	225	13.5x17.8x14	B/ATX	6/2	0/8	300W/300W
570/R	150/370	8.3x17.3x26.4	ATX	7/1	1/2	300W/300R
571/R	160/370	8.3x17.3x26.4	ATX	6/1	1/2	300W/300R
582	105/120	7.8x16.5x23.2	ATX	6/0	2/1	250W/300W
588	105/120	7.8x16.5x23.3	ATX	5/0	1/3	250W/300W
1400/R	715	16x20x24	F/ATX	14/0		300R
1620/R	950	16.5x20.3x34.3	F/ATXx2	16/0		300R

*Case Color: Blue, Purple, Green, Orange, Red.

**Case Color: Blue, Purple, Green, Red, Black.

Model# Starts with:

1 for Slim Case
2 for Desktop Case
3 for Mini-Mid Case
4 for Mid Case
5 for Full/File Server Case
Side Open: Side Panel can be removed independently
Slide Door: Sliding front door up and down
Slide MB Plate: Motherboard tray ca slide in and out form rear

MB SIZE = MOTHERBOARD SIZE • **F**= FULL SIZE • **B**= BABY SIZE
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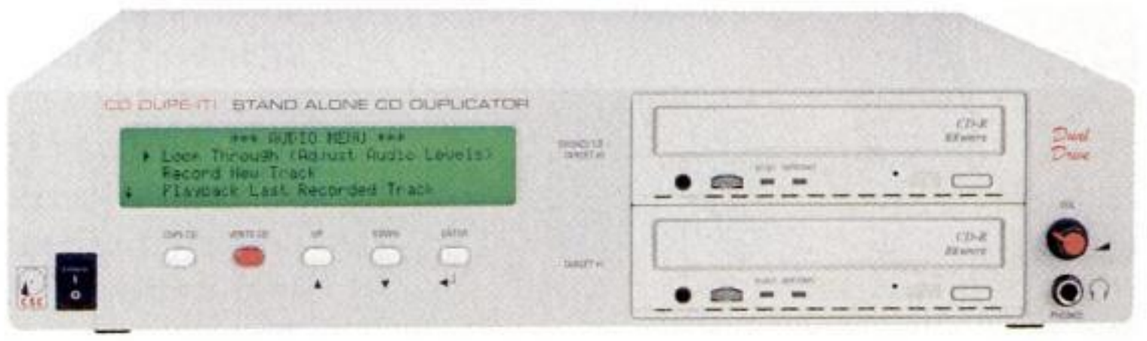
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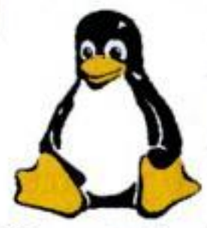

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AMD ATHLON 1.1 GHZ	**$ 1065**	(mpsp082)
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AMD ATHLON 1.33 GHZ	**$ 1105**	(mpsp084)
AMD ATHLON 1.4 GHZ	$ 1135	(mpsp085)

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- 56x CD-ROM
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- **64MB nVidia GeForce-2** DDR Video
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Intel Pentium 4 1.5 GHZ	**$ 835**	(p49sp083)
Intel Pentium 4 1.7 GHZ	**$ 919**	(p49sp084)
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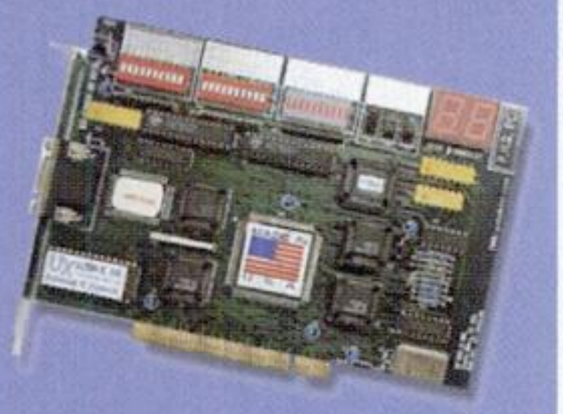

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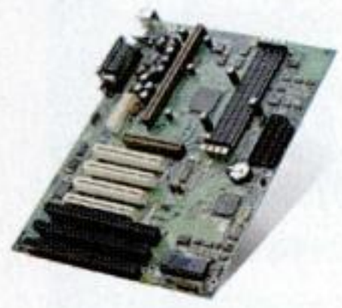

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IN THE MAXIMUM PC SEPTEMBER ISSUE!

Dream Machines 2001!

That's right, this year we give you not one but *three* Dream Machines—each built with reckless disregard for price, sensibility, and personal safety. Stuffed with ultimate power parts from stem to stern, the triumvlrate of elite PC fighting machines includes...

- The ultimate PC **entertainment center** for TV, DVD, and music playback.
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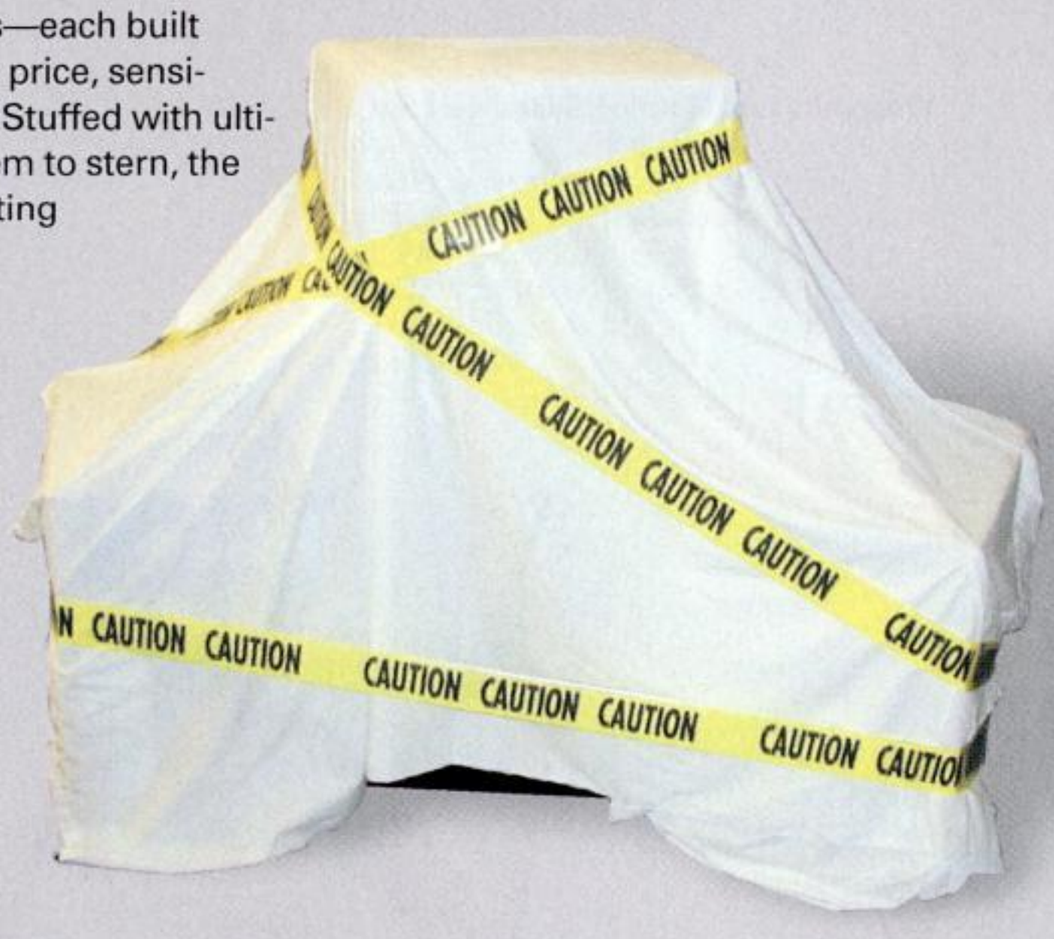

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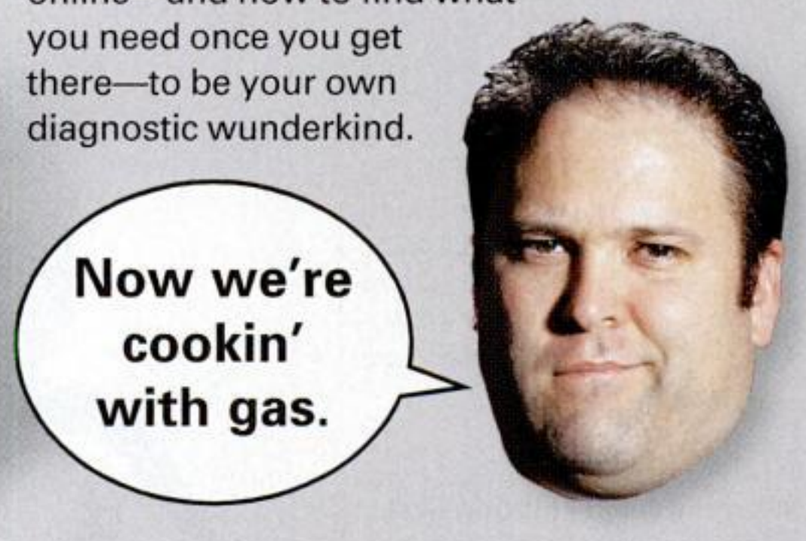
Optical Technology Awareness Workshop

Raise your optical-technology consciousness! We enlighten you on the great strides being made in the world of optical, including emerging technologies that will double and triple current CD capacities. Plus, a report on the hostilities surrounding writeable-DVD standards and our projections about which will emerge exultant.

We send optical expert Logan Decker "inside" the laser-etched world of shiny discs for a full report.

How to Be Your Own Tech Support Guy

PC's busted, huh? Can't stomach the idea of waiting three hours to get through to tech support? We'll show you where to go online—and how to find what you need once you get there—to be your own diagnostic wunderkind.



State of the State of MP3

Napster's down and out, but there's a slew of supposed replacements rearing their heads. Are any worth your time? Our tests will tell.

Just what is the new MP3Pro standard? Will it really mean better-quality files? And will MP3Pro files play on your existing MP3 players? We'll sing like a canary about this and more.

Plus...

Reviews of 128K wireless Internet services, blazing-fast Pentium 4 systems from Dell and HP, the first double-density CD-R/RW burner, and a pair of inexpensive LCD monitors.

original material

Booty2Booty

A showdown among lovely PC competitors

THIS MONTH: Videogame Heroines

***Tomb Raider*'s Lara Croft and *No One Lives Forever*'s Cate Archer are both hottie British superheroines, but the methods to their madness are varied. Who's got the upper hand when it comes to fighting? Strategizing? Accessorizing? May the best vixen win!**

"Assets": It would seem that Lara's been spending her off-time lining the bank account of a very happy plastic surgeon. We have to assume that she's also been putting in some quality time with the chiropractor, because that is one helluva load to be carrying around. Still, we can't help but salute them... sorry, her. We salute *her*. **Winner:** Lara

Weaponry and Fighting Skills: She's all about the John Woo dual-pistol approach—except of course during "close encounters," when she chooses something a little more pointed and tactical. Like an Uzi. Lara's gymnastic feats are unsurpassed when the ledges she's aiming for are square in front of her, and we'll forgive her lateral movement deficiencies because her overall fighting style is so damn boobs-to-the-wall. **Winner:** Lara

Accent/Background/ Personality: Why does she always have to sound so... clipped? Lara's icy accent immediately pegs her as the daughter of a privileged landowner and an alum of elite schools. Frankly, we think she could stand to be a little saucier. And worldwide adventures seem almost de rigeur for those wealthy enough to pursue them at will. We like her spunk, but Lara could use a little more of an edge. **Winner:** Cate

Fashion Sense: Lara's function-over-fashion shorts and tank tops are probably better suited for her never-ending jumping puzzles than any of Cate's ensembles would be. But really, can't an heiress afford to dress a little less like a Boy Scout? Tomb raiding is no excuse not to look one's best, Lady Croft. **Winner:** Cate

Weaponry and Fighting Skills: Her lipstick bombs and sleeping-gas perfume atomizer give new meaning to the phrase "cosmetic makeover." Compared to Lara, Cate's fighting style follows a more subtle, less messy approach—skills that are worth emulating if you're, say, performing an appendectomy. Otherwise, subtlety is kinda boring. **Winner:** Lara

Fashion Sense: She's got short-short skirts and go-go boots that won't quit. She's also got our personal fave: the skintight catsuit with swingin' 1960s stripes. Coupled with white-framed sunglasses, Cate's retro get-ups are seriously hot stuff. She probably wouldn't blend into a crowd very well, but, damn, she's got fashion sense to burn. **Winner:** Cate

"Assets": No doubt, Cate is a hottie, but Lara is a Russ Meyer fantasy gone amuck. 'Nuff said. **Winner:** Lara

Accent/Background/ Personality: Cate's advantaged childhood ground to a halt when her father took his own life, and her entry into a life of crime—stealing only from the wealthy, of course—is what ultimately led her into the secret-operative profession. We can't help it: We're suckers for a bad girl, and Cate's darker side pushes her ahead in this category. **Winner:** Cate

THE UPSHOT They're both hot, so *we* win.

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